GOVERNMENT OF INDIA

MINISTRY OF COMMERCE & INDUSTRY

REPORT

OF THE

AD-HOC COMMITTEE ON COTTONSEED OIL INDUSTRY

1958

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PERSONNEL OF THE COMMITTEE

Shri N. Srinivasan	*Chairman*
Shri K. Vyasulu	Member
Shri F. G. T. Menezes	Member
Shri E. Svendsen	Member
Shri S. H. Turner	Member
Dr. A. Chatrapati	Member
Shri Tulsidas M. Vishram	Member
Shri G. V. Sirur	Member
Dr. R. Sankaran	Member
Shri V. A. Mehta	Member-Secretary

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CHAPTER 1

INTRODUCTION

A conference was convened on the 17th August, 1957 in the Ministry of Commerce and Industry under the chairmanship of Shri Manubhai Shah, Minister for Industries, to discuss measures necessary for the development of cottonseed crushing on a priority basis. The meeting was attended by representatives of the Planning Commission, Ministries of Food and Agriculture and Finance; Council of Scientific and Industrial Research; East India Cotton Association; cottonseed crushers; vanaspati industry and Acetate rayon manufacturers. In accordance with the decision taken at this meeting, Government of India, *vide* letter No. 11(29)/57-NF and MC dated 28th October 1957 set up an *ad hoc* Committee for the industry with the following terms of reference:

(a) to examine the immediate problems of the industry and suggest ways and means for its speedy development.

(b) to examine the present position of the industry, *e.g.* installed capacity, annual production etc. and suggest suitable locations for new units.

(c) to suggest fiscal measures which could give necessary incentive for the crushing of cottonseed and the consumption of cottonseed oil as cooking oil and in the manufacture of vanaspati.

(d) to suggest measures for developing the use of decorticated cottonseed cake.

2. The Committee consisted of the following:—

(1) Shri T. R. Sathe, Special Officer, Ministry of Commerce & Industry	*Chairman*
(2) Shri N. Srinivasan, Industrial Adviser (Chemicals), Ministry of Commerce & Industry	Member
(3) Shri K. Vyasulu, Director (Industry), Planning Commission	Member
(4) Shri F. G. T. Menezes, Deputy Director (Vanaspati), Ministry of Food & Agriculture	Member
(5) Mr. E. Svendson, M/s. East Asiatic Co. India Ltd., New Delhi	Member
*(6) Mr. R. D. Campbell, representing the Vanaspati Manufacturers Association of India	Member
(7) Dr. A. C. Chhatrapati, representing the Vanaspati Manufacturers Association of India	Member

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(*) Mr. S.H. Turner, Chairman, Hindustan Lever Ltd., represented the Vanaspati Manufacturers Association of India from March 1958 onwards, in place of Mr. R.D. Campbell.

Dr. R. Sankaran, Secretary of the Indian Central Oilseeds Committee was appointed in additional member of the *ad hoc* Committee on Cottonseed Oil Industry *vide* Ministry of Commerce and Industry letter No. 11(29)/57-MC dated 18-4-58.

(8) Shri Tulsidas M. Vishram, representing Central Organisation of Oil Industry and Trade	Member
(9) Shri G. V. Sirur, M/s. Sundatta Foods & Fibres Ltd., Hubli	Member
(10) Shri V.A. Mehta, Deputy Development Officer (Food Industries), Ministry of Commerce & Industry	Member-Secretary.

2. Shri T. R. Sathe, Chairman of the Committee resigned from the services of the Government of India and Ministry of Commerce and Industry, *vide* letter No. 11(29)/57 Chem. II dated 22nd September 1958 appointed Shri N. Srinivasan, Industrial Adviser (Chemicals) as Chairman of the *ad-hoc* Committee on cottonseed oil industry.

3. The Committee held its first meeting at Bombay on 14th December 1957, the second meeting at New Delhi on 1st March 1958, the third meeting at Madras on 14th June 1958 and the last meeting at New Delhi on 8th October 1958 and 9th October 1958.

4. The Committee issued questionnaires to the following parties with the object of collecting data and eliciting their views on the subject (Appendices No. 6 to No. 12).

TABLE No. 1

		No. of questionnaires issued	No. of replies received
1.	Vanaspati factories	45	40
2.	Dairy farms, Goshalas, Pinjrapoles and Agricultural Colleges	240	30
3.	Directors of Industries	14	4
4.	Cottonseed oil mills	123	45
5.	Soap Manufacturers	26	17
6.	Rayon Manufacturers	5	5
7.	Oil Millers Association	32	7
8.	Other Associations	12	8

A number of Research Institutes were also addressed in connection with investigations carried out on cottonseed and cottonseed products.

CHAPTER 2

IMPORTANCE OF THE INDUSTRY IN INDIA'S ECONOMY—PROGRESS MADE IN OTHER COUNTRIES—GROWTH OF THE INDUSTRY IN INDIA

The important cotton producing countries in the world make use of cottonseed as a source of edible oil. In the U.S.A., for example, 90% of seeds grown are crushed and utilised in the manufacture of shortening, margarine and other food products. Cottonseed oil industry has also been developed in Uganda, Japan, Iran and other countries.

2. In India, however, the bulk of the cottonseed is fed to cattle and hardly 6 to 7% of the present annual production of cottonseed, (1·6 million tons) is crushed. The importance of the cottonseed crushing industry in India's economy, will be apparent when it is realised that it is capable of contributing to the national wealth to the extent of over Rs. 10 crores annually. Cottonseed crushing will augment the oil resources of the country without increase in the acreage under oil seed cultivation; lead to fuller utilisation of the existing expeller capacity in oil mills, increase employment opportunities, provide scope for earning foreign exchange by export of cottonseed products and develop self-sufficiency in regard to linter pulp or chemical cotton, which is the basis of important industries like, high tenacity tyre cord viscose; cellulose acetate for rayon, plastics and photographic film; nitro-cellulose for leather cloth, celluloid, explosives and lacquers; carboxy methyl cellulose and filler for moulding powedrs.

3. The growth of industry in India has been rather slow on account of various reasons. Firstly the age old custom of the Indian farmer to feed his cattle with whole cottonseed has provided a large demand and ready market for cottonseed. This factor, coupled with speculative trading often pushes up the price of seed beyond crushing parity and hinders the progress of the industry. The whole seed cannot also be economically crushed in village ghanis. The industry could not therefore, take root in rural areas. The oil content of cottonseed is small compared to that of other oil seeds like groundnut and the yield is also reduced if crushing is done without delinting and hulling operations. The Indian farmer is generally averse to the use of cottonseed cake in the mistaken belief that it is not sufficiently nutritive for the cattle. There has also been difficulty in disposing of hulls and linters. Raw cottonseed oil cannot be used like other oils as it is dark in colour and is inedible without special refining. Considerable quantity of dark-

was the case with groundnut oil in the twenties. Groundnut oil only came into prominence with the setting up of Vanaspati factories. A market was thus created not only for Vanaspati but for refined groundnut oil.

4. Earlier attempts to produce cottonseed oil were directed towards crushing the seeds without delinting and hulling operations. Messrs Indian Cotton Oil Mills, Navsari are mentioned as pioneers in the production of cottonseed oil.

5. In 1938 a complete plant for delinting and hulling cottonseed was installed by Messrs Modi Industries Ltd., Modinagar. After the plant had worked for a few months in 1939, it was found that the prospects for this industry were not favourable. The entire cottonseed preparatory machinery was sold by Messrs Modi Industries to some firm outside India. Modis, however, continued for some time to crush cottonseeds in their oil mills, and used the oil for hydrogenation purpose.

6. In 1944, the late Prof. Athawale, Oil Expert to the Uttar Pradesh Government, investigated the possibility of developing cottonseed crushing in India and published his results in "Indian Farming" (July 1944). Professor Athawale considered that there was considerable scope for the development of this industry in important cotton growing regions like Khandesh, Bombay, Madhya Pradesh, Berar, Hyderabad and Madras.

7. Subsequently in 1945-46, the Advisory Committee appointed by Government to look into the future expansion of the Vanaspati industry also discussed the question of cottonseed oil and concluded that nearly 8% of the oil in cottonseed was being wasted, if the whole seed were fed to cattle. The Committee felt that in the national interest cottonseed should be crushed and only the cake fed to cattle. In December 1946, the Panel on Oils and Soap industries of the late Planning and Development Department recommended that Government should encourage the setting up of mills for crushing cottonseed in every possible manner and facilities should be given for the import of machinery for crushing cottonseed and refining the oil.

8. The Planning Commission (1951) laid considerable emphasis on the development of cottonseed industry in the first Five Year Plan and fixed a production target of 12,500 tons of cottonseed oil. The Commission realised that there were a number of difficulties in the way of rapid development of the industry. In the Second Plan period (1956-61) a production target of 30,000 tons of cotton-

PRESENT POSITION OF COTTONSEED CRUSHING IN INDIA—AVAILABILITY OF COTTONSEED—ITS COMPOSITION—LOCATION OF UNITS—PRODUCTION, CONSUMPTION AND EXPORTS OF COTTONSEED OIL—PRICES.

There are at present two distinct sectors of Cottonseed oil industry in India. (a) the organised crushers who have installed the full range of equipment including seed-cleaning, delinting and hulling machinery and produce oil on scientific lines, (b) Small and medium sized oil mills who, besides handling other oil seeds also crush cotton seed without delinting and produce undecorticated cottonseed cake. The crushing of non-fuzzy seeds which contain very little linters could be advantageously undertaken by unorganised smaller units not equipped with delinting machinery. The Committee is of the opinion that the sector may be encouraged to crush non-fuzzy seeds.

2. Production of cottonseeds in India is related to the production of cotton. The Planning Commission have fixed 5·5 million bales as target of production of raw cotton in the Second Five Year Plan. This would yield at least 1·8 million tons of cotton seeds. Emphasis has also been laid in the Plan on the production of improved variety of cotton in the areas brought under major irrigation projects. It is estimated that the production on improved varieties by 1960-61 will reach 2·2 million bales or 40 per cent. of the total cotton grown in the country. The following table gives the production of cotton and cottonseeds in India during 1955-56, 1956-57 and 1957-58 (Source—Directorate of Economics and Statistics, Ministry of Food and Agriculture):

TABLE No. 2

*Final estimates

States (as reconstituted)	Production of cotton (in thousand bales of 392 lbs. each)			Production of cottonseed (in thousand tons)		
	1955-56	1956-57	1957-58	1955-56	1956-57	1957-58
1	2	3	4*	5	6	7*
Andhra Pradesh	131	135	127	46	47	45
Assam	9	9	8	3	3	3
Bihar	2	1	1	1	(b)	(b)
Bombay	1,921	2,176	2,130	672	762	746
Kerala	10	10	10	4	4	3
Madhya Pradesh	[illegible]	655	464	141	[illegible]	[illegible]

1	2	3	4*	5	6	7*
Mysore . . .	363	358	512	127	125	179
Orissa . . .	2	2	2	1	1	1
Punjab . . .	695	800	825	212	280	289
Rajasthan . .	184	167	215	64	58	75
Uttar Pradesh .	29	46	61	10	16	21
Tripura . .	7	8	8	2	3	3
TOTAL . .	4,001	4,723	4,753	1,400	1,653	1,664

(*b*) Less than 500 tons.

N.B.The proportion of cottonseed to cotton lint in Kapas (seed cotton) is 2:1 on an average.

3. The Committee examined the composition data in respect of samples of cottonseeds from different parts of the country, as determined by the Oil Technological Research Institute, Anantapur, Regional Research Laboratory, Hyderabad, Technological Laboratory of the Indian Central Cotton Committee and the Central Food Technological Research Institute Mysore and came to the following general conclusions:—

(a) Long staple variety of cotton (G. Hirsutun) generally yield fuzzy cottonseeds rich in linters and having oil content. There are however exceptions *e.g.*, Jayadhar in Bombay State, is a long staple variety but the linter content is 3.3 per cent. against 10—12 per cent. for the American variety.

(b) Several Desi varieties of cottonseeds (G. Arboreum and G. Herbaceun) with medium staple contain high percentage of oil and linters and can be processed economimally for the recovery of oil and other products.

(c) The objective of the industry in the organised sector should be to crush such seeds which are rich in linters (fuzzy) and at the same time have higher oil content, it being immaterial whether they are of American or Desi Origin piled by various Institutes in the country engaged in carrying out investigations on oil and oilseeds:—

Table No. 2.

Name of the State	Name of the variety of the seed	Botanical species	Oil content	Linter content	Name of the Institute
1	2	3	4	5	6
Andhra Pradesh	1. Coconadas .	G. Arboreum	18·2	5·7	O.T.I.A.
	2. Laxmi (American)	G. Hirsutum	16·9	10·5	,,
	3. Desavali .	G. Arboreum	21·8	10·7	,,
	4. N-14 Northern	,,	16·2	7·3	,,
	5. Gaorani-12 .	,,	18·6	8.0	,,
	6. Hyderabad American . .	G. Hirsutum	20·5	13·2	R.R.L.H.
	7. China Patti .	..	21·7	8·6	O.T.I.A.
	8. R.K. 19 . .	..	17·5	5·4	R.R.L.H.
Madras .	1. Madras American (Uganda)	.Hirsutum	17·0	11·3	O.T.I.A.
	2. Cambodia . .	,,	16·0	11·4	,,
Mysore .	1. American (Laxmi)	G. Hirsutum	18·5	8·5	O.T.I.A.
	2. Mysore American	,,	19·8	7·8	,,
	3. Local Doddapatti	G. Arboreum	16·8	15·7	,,
	4. Local Sannahatti	,,	14·7	9·9	,,
	5. Selection 69 .	,,	16·4	8·7	,,
Bombay .	1. Virnar . .	G. Arboreum	19·1	6·6	O.T.I.A.
	2. Jarilla . .	,,	19·1	7·9	,,
	3. Buri 0397 . .	G. Hirsutum	19·0	7·6	,,
	4. Bombay American	,,	18·5	8·5	,,
	5. Jalgaon . .	G. Arboreum	17·2	9·2	CFTRI
Madhya Pradesh	1. Malvi . .	G. Arboreum	20·0	7·5	O.T.I.A.
	2. Indore 2 . .	G Hirsutum	19·6	8·1	,,
	3. Buri . .	,,	19·0	9·0	,,
	4. Cambodia . .	,,	19·1	12·9	,,
	5. Jarilla . .	G. Arboreum	18·9	7·6	,,
Rajasthan .	1 216 F . .	G. Hirsutum	19·2	12·9	,,
	2 L. S.S. . .	,,	20·5	7·8	,,
Punjab .	1 216 F . .	,,	18·7	11·8	
	2 320 F . .	,,	21·2	10·7	
	3 Desi . .	G. Arboreum	15·7	8·5	

CFTRI : Central Food Tech. Research Inst. Mysore.

OTIA : Oil Techno. Institute, Anantapur.

RRLH : Regional Research Laboratory Hyderabad

5. The present statewise availability of fuzzy type of cottonseed has been estimated as follows on the basis of All-India final estimate of cotton 1957-58 (Directorate of Economics and Statistics, Ministry of Food and Agriculture):—

Table No. 4.

Sl. No.	Name of the State	Estimated availability of fuzzy type of seeds in "000 tons".
1	Andhra	15
2	Madras	88
3	Mysore	96
4	Bombay	362
5	Madhya Pradesh	148
6	Rajasthan	22
7	Punjab	192
	TOTAL . . .	923

6. Cottonseeds are commercially available from the ginneries. It would be useful to examine the present position of the ginning industry in the country including the location of the ginneries, in order to determine the most suitable locations for the setting up of new cottonseed oil mills. Kapas or seed cotton as harvested contains both lint and seed. The ginning process separates the two; without damage to the seed or the lint. The bulk of the cottonseed in India is ginned in power-driven plants. Two types of gins are used—roller gins and saw gins, the former being more common. Ginned cotton is marketed in the form of pressed bales. Cottonseed from ginneries moves to oil mills for crushing or to the farmer for feeding the cattle. The ginning industry in India is of a seasonal character. The season follows closely the harvests of cotton and varies in different regions as indicated below:—

(Source—"Cotton in India" published by Economic and Statistical Adviser, Ministry of Food and Agriculture.)

Sl. No.	States	Harvesting period
1	Andhra Pradesh	April-August.
2	Hyderabad Region	November-January (Kharif March-April crop) (Rabi crop)
3	Bombay	January-April.
4	Madhya Pradesh	November-March.
5	Madras . .	April-August

Majority of the ginneries are situated in the black cotton soil tracts of Bombay, Madhya Pradesh, Madras and Mysore. The region-wise distribution of ginneries is given in the following statement:
(Source: Indian Central Cotton Committee):

Table No. 5.

States	No. of cotton ginning factories	No. of cotton pressing factories
Andhra Pradesh	24**	39
Assam	4	7
Bihar	..	..
Bombay	1278**	567*
Kerala	..	..
Madhya Pradesh	140	88
Madras	146	22
Mysore	471	91
Orissa	..	..
Punjab	(*a*)	134
Rajasthan	127	56
Uttar Praesh	12	14
West Bengal	9	6
Delhi	..	..
Himachal Pradesh	..	..
Tripura	2	2
	2213	1026

(*) Includes 8 factories in Bombay which press cotton waste and repressed cotton.

(**) Excludes factories, in former Hyderabad State for which information is not available.

(*a*) Not available.

7. *Statewise location and capacity of cottonseed Oil Mills:—*

(a) *Organised Sector.*

The Committee is of the opinion that the installed capacity of cotton seed oil mills in the organised sector ought to be rated not merely by the expeller capacity but by the capacity of the delinting machinery.

It was represented to the Committee that the existing cottonseed oil mills do not work throughout the year for one reason or the other. The number of working days range between 180 to 250 per annum. The Committee considered that the installed capacity of the factories may be worked out on the basis of 200 working days existing as well as newly licensed units has been shown separately in the table.

Table No. 6.

(Capacity in tons in terms of cottonseeds—200 working days per year).

Sl. No.	Name of the State	Existing capacity in the Organised sector.		Licensed capacity which has not yet come into being.		Total	
		Delinting Capacity	Expeller Capacity	Delinting Capacity	Expeller Capacity	Delinting Capacity	expeller Capacity
1	2	3	4	5	6	7	8
1	Andhra Pradesh .	5,200	15,600	12,000	12,000	17,200	27,600
2	Madras . .	15,000	30,000	..	..	15,000	30,000
3	Mysore . .	12,000	12,000	59,000	59,000	71,000	71,000
4	Bombay . .	28,000	57,600	1,77,700	1,77,700	2,05,700	2,35,300
5	Madhya Pradesh .	30,000	30,000	16,000	16,000	46,000	46,000
6	Punjab . .	..	..	16,000	16,000	16,000	16,000
	TOTAL .	90,200 (11 units)	1,44,200 (11 units)	2,70,800 (17 units)	2,70,800 (17 units)	3,70,900 (28 units)	4,25,900 (28 units)

The Committee understands that a number of mills licensed under the Industries (Development and Regulation) Act have not yet taken effective steps to set up their units. The Committee is of the opinion the Government should review their progress at an early date and take steps where necessary to revoke licenses which block up capacity. The revoked capacity may be allotted to others deserving applicants from the same state.

(b) *Unorganised Sector.*

Cotton seed oil mills which are not equipped with delinting machinery have been classified under the head "Unorganised sector". Such units crush cotton seed periodically when it pays them to do so or when other oil-seeds are not available at a satisfactory price. Particulars regarding such units as far as known to the Committee are given below:—

Sl. No.	Name of the State	No. of units in the unorganised sector	Annual installed capacity

It may be seen from Table No. 6 that while delinting capacity of the existing units is 90,200 tons, the expeller capacity is 1,44,200. New units licenced under the Industries (Development and Regulation) Act during last two or three years are required to install delinting and hulling machinery as per condition included in the licence and the expeller capacity is expected to match their delinting capacity.

The names of the existing as well as licensed units equipped with delinting machinery in the organised sector in different states are given below:—

Andhra Pradesh .	1. B. Rajendra Oil-Mills Hyderabad .	Existing units
	2. Alimchand Topandas, Adoni .	,, ,,
	3. Rallis (India) Pvt. Ltd., Guntakkal .	Licensed but not yet installed.
Madras . . .	4. East Asiatics (India) Pvt. Ltd. .	Existing units.
Mysore . . .	5. Brahmappa Tavanappanavar Pvt Ltd. Davangere	Existing unit, expansion licensed.
	6. Sundatta Food & Fibres Ltd. Hubli	Do.
	7. Ravi Vegetable Oil Industries, Davangere	Licensed but not yet installed.
Bombay	8. New Kamal Oil Mulls, Amravati	Existing unit.
	9. Mansingka Oil Mills, Amraavti .	,, ,,
	10. Vegetable Oil Mfg. Co., Badnera .	,, ,,
	11. Akola Cottenseed Oil Mills, Akola	,, ,,
	12. Purshotam Das Nathabhai & Co., Himmatnagar	,, ,,
	13. Hanuman Oil Mills, Khamgaon .	Licensed but not yet installed.
	14. Indian Cotton Oil Mills, Navsari (Swadheen Industries) .	Do.
	15. Standard Cottonseed Oil Mills, Bombay	Do.
	16. National Products Co., Bombay	Do.
	17. Sonawala Industries, Bombay	Do.
	18. Berar Swadeshi Industries, Shegaon	Do.
	19. Shri Ram Oil Mills, Bombay .	Do.
	20. Ulhas Oil Mills, Bombay . .	Do.
	21. Bombay Oil Industries, Bombay, .	Do.
	22. Premji Haridas & Sons, Bombay	Do.
	23. Mansingka Oil Mills, Bombay .	Do.
	24. Jagdish Oil Industries, Porbunder	Do.
	25. Morvi Vegetable Products, Morvi .	Do.
Madhya Pradesh	26. Government of Madhya Pradesh .	Do.
	27. Mansingka Oil Mills, Khandwa .	Existing unit.
Punjab	28. Ginners and Presser's Ltd., Abohar	Licensed but not yet installed.

6. *Statewise production.*—The production of cottonseed oil during 1957 and 1958 (January—June) in the organised sector has been as follows:—

Table No. 7.

Sl. No.	Name of the State	Production of cottonseed oil in tons. 1957	1958 (Jan-June)
1	Andhra Pradesh . . .	800	418
2	Mysore	1605	810
3	Bombay	4874	4140
4	Madhya Pradesh. . .	1 361	1475
	TOTAL . .	8640	6843

The production of cottonseed oil in the unorganised sector in the country has been estimated as 6,000 tons in 1957 and 4,000 tons in 1958 (Jan—June). Thus the total production in the two sectors was 14,640 tons in 1957 and 10,843 in 1958.

7. *Consumption of Cottonseed Oil.*—The pattern of consumption of cottonseed oil for different purposes during 1957 and 1958 (Jan—June) has been somewhat as follows:—

	1957	1958 (Jan-June)
(*a*) Utilisation in the manufacture of vanaspati	3943 tons	6168 tons
(*b*) Utilisation in the production of soap in the unorganised sector of soap industry	3000 ,,	2000 ,,
(*c*) Export	8016 ,,	2417 ,,
TOTAL . .	14,959 ,,	10,585 ,,

8. *Export of Cottonseed Oil.*—Cottonseed oil is being allowed to

and cottonseed cake (decorticated and undercorticated) during the last few years:—

Table No. 8.

Year	Cottonseed oil		Cottonseed oil cake-decorticated and undecorticated.	
	Qty. tons.	Value Rs.	Qty. tons.	Value Rs.
1954-55 . . .	3193	39,70,520	1117	2,33,761
1955-56 . . .	5428	65,61,050	24706	68,41,971
1956-57 . . .	7648	1,26,00,381	10030	32,42,082
1957 (Jan-Dec) . .	8016	1,20,16,998	7225	22,43,335
1958 (Jan- June) . .	2417	36,34,323	2098	4,09,496

9. The price of cottonseed is an important factor governing the economics of cottonseed oil industry. The price of cottonseed oil has also to be competitive *vis-a-vis* groundnut oil in order to make it attractive for the manufacture of Vanaspati or for use as an edible oil. The prices of cottenseed oil and cottenseed cake with relative prices of groundnut oil during recent years have been given in Appendices No. 1, 2 and 3.

CHAPTER 4

PROBLEMS OF THE INDUSTRY

Cottonseed crushing is not usually as remunerative as the crushing of other oil seeds. The price of cottonseed is often high due to its main use as cattle feed. It was suggested to the Committee that production of cottonseed oil should be encouraged, by imposing restrictions on feeding the fuzzy type of cottonseed to cattle. The Committee considers that this suggestion is impracticable and difficult to implement.

2. The Committee received a suggestion that the crushing of American type cottonseed should only be done in plants which are equipped with seed cleaning, dehulling and delinting machines, and cotton ginning factories should be asked to sell cottonseeds of American type exclusively to modern cottonseed oil mills. The Committee is unable to support these suggestions as it would not be possible to implement them.

3. The price of cottonseed is often artificially elevated in the speculative market far beyond parity. It was represented to the Committee that forward markets in cottonseed should be banned. The Committee is of the opinion that the Forward Markets Commission may be requested to keep a watchful eye on the speculative activities of the forward markets of cottonseeds so that such activities may not hinder the availability of cottonseed for crushing purposes by pushing the prices beyond crushing parity. The Committee further recommend that the Forward Markets Commission may also consider whether the practice reported to be adopted at Bombay of excluding the fuzzy variety of cottonseed from tendering against forward contract can be extended to other exchanges dealing in cottonseed.

4. It was represented to the Committee by M/s. Manshingka Oil Mills, Khandwa that the importance of the industry should be explained to the Madhya Pradesh State Government who should not impose sales tax and *octroi* tax on cottonseed. The Committee was informed that the Government of Madhya Pradesh had notified, that from July 1957 sales tax would be imposed on cottonseed used for manufacturing purposes, which meant that cottonseed used for cattle feeding would be exempted from such a tax.

This matter was examined by the Committee at its Second meeting when a representative of the Ministry of Finance who was specially invited, explained that the levy of sales tax on cottonseed or any other commodity is constitutionally a State subject and the Government of India could only request that State Government to waive such levy on cottonseed on special considerations.

The Committee considered that matter and came to the conclusion

India should at least request them not to exempt cottonseed for cattle feeding from such tax, otherwise, increasing quantities of cottonseed would be diverted for cattle feeding instead of being crushed.

Regarding *octroi* tax, the representative of the Ministry of Finance informed the Committee that it was being levied by local bodies to supplement their revenue and this was also a State subject. It was for the State Government to advise local bodies to consider the abolition of octroi duty on cottonseed. The Committee feels that the State Government should, therefore, be requested to persuade the local bodies to exempt cottonseed used for crushing from the levy of *octroi* tax.

5. The industry represented to the Committee that financial assistance by way of long term loan may be given by the Government for starting new cottonseed oil mills. The Committee agrees that the Government of India may advise the State Financial Corporations to accord high priority to this industry in their scheme of assistance to industrialists.

6. One of the problems faced by the industry is that banks are often reluctant to finance cottonseed and its products as these are not on the accepted commodity list of banks. The Industry represented to the Committee that all scheduled banks should be advised to advance liberally to cottonseed oil mills on cottonseed and its products at a low rate of interest. The Committee has examined this matter at length and feels that this question should be referred by the Government to the Reserve Bank for their advice and suitable action.

7. Government of India completely abolished the excise duty on cotton seed oil in August 1957 so as to give encouragement to this industry. The Committee recommends that this policy should continue for at least five years and the position reviewed thereafter. Such an assurance by Government would go a long way in the speedy development of this industry.

8. *Transport facilities and railway freight.*—The Industry represented to the Committee that wagons are not easily available for the despatch of different types of cottonseed products to various stations all over India and suggested that:—

(i) priority should be given for the movement of cottonseed products which should be moved as preferential traffic;

(ii) arrangements should be made to allow certain fixed number of wagons per day or week to each registered manufacturer according to production capacity;

(iii) such daily quota of wagons should particularly be sanctioned for those stations where the inward release wagons are not many;

The representative of the Railway Board who was specially invited to the Second meeting of the Committee explained that:—

(a) the question of raising the priority for the movement of cottonseeds from "E" to "D" in the preferential traffic schedule had been examined by the Railway Board from time to time, but it could not be accepted as this would adversely affect the movement of more essential traffic now accorded high priority;

(b) Allotment of fixed number of wagons per day or week to an individual manufacturer was not always possible as this would amount to discrimination in favour of a particular party.

The representative of the Railway Board added that the fleet of wagons both on broad and metre gauge has increased considerably and by 1959-60, this number is expected to go up further. The Committee hopes that the transport difficulties now faced by the Industry may be solved to a considerable extent after 1959-60 with the increase in number of wagons.

9. It was represented to the Committee by the cottonseed oil mills in the Punjab that the railway authorities have fixed a minimum load of 500 maunds per wagon which till last year was only 450 maunds. As cottonseed is a light commodity and requires large space as compared to other oil seeds, it is not generally possible to load 500 maunds in a wagon. The Industry in Punjab further pointed out that payment has to be made for 500 maunds even if the quantity loaded is less. The representative of the Railway Board explained to the Committee that the minimum load of cottonseed was enhanced from 450 to 500 maunds on the recommendation of the Commercial Committee for Inter-charge. From test weighments made by the Railway it was found that this commodity could be loaded upto 500 maunds and in actual practice the trade is already loading wagons to more than this quantity. The Committee agrees with the Railway Board that in the interest of conservation of space, it is not desirable to lower the existing minimum of 500 maunds.

10. The cottonseed oil millers in Punjab also represented that:—

(i) There were 37 cottonseed oil mills in their State before partition. After partition it became a problem to run the industry and the mills had to obtain cottonseed from Madhya Pradesh and Hyderabad.

(ii) Cottonseed grown in Punjab is not readily available to the crushers at competitive rates.

(iii) The railway freight on cottonseed from Madhya Pradesh to the oil mills in Punjab is prohibitive and forms 30 per cent of the price on cottonseeds and the development of cottonseed oil industry in the State has been retarded due to high railway freight on cottonseed.

The Committee discussed this matter at length and came to the conclusion that there was little justification for the millers in Punjab to import cottonseed from Madhya Pradesh and Hyderabad particularly in view of adequate production of fuzzy variety of cottonseed in their own State to the extent of 192,000 tons per annum. At present hardly 50,000 tons of seed grown in Punjab are crushed within the State.

11. The Cottonseed oil industry in Punjab represented to the Committee that the Railway freight on cottonseed which contains a lower percentage of oil in comparison with groundnuts should be reduced and oil content should be the main criterion while determining the railway freight on different oil seeds. They pointed out that the Planning Commission has in the first five-year plan also recommended reduction in Railway freight on cottonseed. Certain cottonseed oil mills in Madhya Pradesh and Mysore State have however suggested to the Committee that the railway freight on cottonseed should not be reduced any may even be enhanced, so that it may be crushed where it is produced and its increased use for cattle feeding purposes is discouraged. These divergent proposals have apparently been made in accordance with the interests of the concerned cottonseed oil mills. The Railway Board have pointed out that the question of reduction of railway freight on cottonseeds was examined at a meeting held by the Planning Commission on 18th May, 1954, when it was considered that there was no justification for any general reduction. The Board may however have no objection to consider suitable reduction in freight rates for movement between specific points where it could be established that the existing rates were hampering the free movement of traffic. The Committee feels that Cottonseed crushers should draw their requirements of cottonseed within a maximum radius of 400 miles and the Railway Board should consider reduction of freight on the movement of cottonseed on station to station basis within 400 miles where a crushing mills is located at or near the receiving station. The Committee realises that this concession will have to be applied to cottonseed meant either for crushing or for cattle feeding as it will be difficult to prevent consignments being used for cattle feeding.

12. The Cottonseed Oil Industry in Madhya Pradesh represented to the Committee that open wagons are often supplied which can not hold even 200 maunds of hulls while freight is chargeable on the minimum load of 300 maunds and closed wagons are not also available for the transport of cottonseed, hulls. The representative of the Railway Board with whom the Committee discussed the matter, explained that it was necessary to use open wagon in view of the general shortage of covered wagons. The Committee feels that the Railway Board should again examine the difficulty in connection with loading 300 maunds of hulls in open wagons. The Committee understand that similar difficulties are also being experienced by cottonseed crushers located on metre gauge lines. The minimum wagon load on meter gauge is fixed at 240 Bengal maunds on 4 wheelers

13. *Cotton linters.*—One of the serious problems confronted by the Industry is the disposal of cotton linter particularly first cut for which a demand has yet to be developed. The Industry had represented in the past to Government that the export duty on cotton linters should be abolished in order to encourage export. The Committee notes with satisfaction that this has already been done early this year and urges that this policy should be maintained for five years and the position re-examined thereafter. The Committee also considers that the linter industry should be organised on the basis of production of first-cut and second cut linters, the former for export and the latter for conversion to linter pulp.

14. It was represented to the Committee that there was considerable difficulty in the disposal of decorticated cotton seed cake in the internal market in view of the age old custom in India of feeding whole cottonseed to the Cattle. The Committee feels that the farmer will have to be educated in regard to the advantages of feeding cottonseed cake in general and decorticated cake in particular.

15. The industry had represented to the Committee that indigenous bleaching earth and activated carbon are not suitable for the manufacture of light coloured cottonseed oil and imports of suitable bleaching earth and activated carbon should be permitted. The Committee recommends that this matter may be considered by the Government favourably.

16. It was pointed out to the Committee that Cottonseed oil machinery like seed-cleaning, delinting and hulling equipment and solvent extraction plant for processing cottonseeds should be allowed to be imported liberally. The possibility of procuring the equipment under the U.S. Export—Import Loan fund and other assistance programmes may be explored by Government. The proposal regarding the import of cottonseed oil machinery on a barter basis by exporting cotton linters is also welcomed by the Committee and it is recommended that the State Trading Corporation might look into the possibility of implementing this suggestion.

17. *Cottonseed Oil.*—One of the problems faced by the industry is the lake of standardisation of the quality of crude as well as washed cottonseed oil. The Indian Standards Institution has already laid down standards for washed cottonseed oil. This standard, needs revision and the Committee recommends that the Indian Standard Institution may do this in consultation with the cottonseed oil manufacturers as well as the large scale consumers of cottonseed oil such as vanaspati and soap manufacturers. The Committee feels that specifications should also be framed by the I.S.I. for crude cottonseed oil. Crude cottonseed oil is very dark and cannot be used for edible purposes directly without refining. This fact has so far retarded the development of market for cottonseed oil as an edible oil.

18. *Manufacture of Vanaspati.*—The Cottonseed oil industry had represented to the Committee that the Vanaspati manufacturers do not patronise the use of cottonseed oil to the extent it should be

with satifaction that the vanaspati manufactures have now agreed to use cottonseed oil in the production of vanaspati—2½% on an annual basis in 1958, 5 per cent in 1959, 7½ per cent in 1960 and 10 per cent in 1961.

19. *Manufacture of soap.*—It has been suggested to the Committee that the use of certain proportion of cottonseed oil should be made compulsory in the manufacture of soap since such oil can replace groundnut which is edible even in crude form. The Committee recommends that at least 5 per cent cottonseed oil may be used in the manufacture of soap.

20. *Disposal of soap stock.*—It is a problem to dispose of cottonseed soap stock which results in the refining of cottonseed oil, for which there is no demand from the soap manufactuers as the colour is very dark. The Committee considers that the only possibility is to manufacture fatty acids and utilise the same for soap making or other industrial purposes.

21. *Research problems.*—The Committee received valuable information regarding the investigations carried out in a number of technical laboratories in India. There is need for coordination in work on cottonseed and its products. The Committee recommends that the Council of Scientific and Industrial Research, may review and co-ordinate the work (Laboratory and pilot plant) undertaken at Anantapur, Hyderabad, Mysore, Bombay, Delhi and Jadavpur, and arrange for the completion of investigations already in progress. The C. S. I. R. should also prepare a technical brochure for use of the crushing mills. The note should incorporate (i) the results of systematic investigation carried out on the composition (Particularly linters and oil content) of important species of cottonseeds (both American and desi varieties) grown particularly in areas where cottonseed mills are situated or proposed to be located, (ii) optimum storage conditions of cottonseeds, (iii) optimum conditions for the pre-treatment of seeds before oil extraction, (iv) optimum conditions for the most economical refining and bleaching operation in order to obtain an edible oil of pale colour with reasonably good storage properties, (v) utilisation of cottonseed hulls in the manufacture of furfurol, activated carbon etc., (vi) characteristics of chemical cotton obtained from linters derived from different species of cottonseeds grown in India.

CHAPTER 5.

PLAN FOR THE FUTURE DEVELOPMENT OF THE INDUSTRY

It will be seen from Table 4 in Chapter 3 that the present estimated availability of fuzzy type of cottonseeds is of the order of 923,000 tons. It should be possible to produce about 115,000 tons of oil by delinting and crushing the entire quantity of fuzzy seeds. The existing installed and licenced capacity of mills in the organised sector is sufficient to crush only 371,000 tons of seeds and produce 46,000 tons of oil.

It was realised by the Committee that large foreign exchange expenditure would be involved in the import of machinery for setting up additional capacity, so as to crush 923,000 tons of fuzzy seeds. Sufficient market for absorbing 115,000 tons of cottonseed oil would also require to be developed. This would be difficult to accomplish in a short period.

The Committee has, therefore, evolved a plan for the speedy development of the industry in two stages. In the first stage, production on an *immediate* basis of about 60.000 tons of cottonseed oil by crushing 480,000 tons of fuzzy seeds is proposed. The second stage would achieve a production of about 70,000 tons of cottonseed oil by processing 560,000 tons of fuzzy seeds. The implementation of the second stage would depend on increased demands of cottonseed oil for internal markets and exports. The Committee also hopes that it may be possible to crush larger quantities of cottonseeds even with the capacity immediately developed by persuading the industry to organise production for more than 200 days in a year. The following table would illustrate the two-stage plan proposed by the Committee:—

TABLE 9

Sl. No.	Name of the State	Present availability[1] of fuzzy seeds	Existing installed and licenced capacity in terms of seeds	First stage development		Second stage development	
				Additional capacity to be developed	Total	Additional capacity to be developed	Total
		(tons)	(tons)	(tons)	(tons)	(tons)	(tons)
1	Andhra .	15,000	17,000	..	17,000	..	17,000
2	Madras .	88,000	15,000	39.000	54,000	..	54,000

Sl. No.	Name of the State	Present availability of fuzzy seeds	Existing installed and licenced capacity in terms of seeds	First stage development		Second stage development	
				Additional capacity to be developed	Total	Additional capacity to be developed	Total
		(tons)	(tons)	(tons)	(tons)	(tons)	(tons)
5	Madhya Pradesh	148,000	46,000	24,000	70,000	12,000	82,000
6	Punjab .	192,000	16,000	48,000	64,000	48,000	12,000
7	Rajasthan .	22,000	..	12,000	12,000	..	12,000
	TOTAL .	(a) 923,000	371,000	123,000	494,000	60,000	554,000
		(b)	46,000	15,000 or	61,000 60,000	7,500 (Approx.)	70,000 (Approx.)

(a) In terms of seeds.
(b) In terms of oil.

2. The Committee would propose the following locations for additional capacity.

TABLE 10

Sl. No.	Name of the State	Existing number of units		Total	First stage development	Second stage development
		Installed	Licenced		Number of units	Number of units
1	Andhra . . .	2	1	3	..	..
2	Madras . . .	1	..	1	2	..
3	Mysore . . .	2	1	3	..	..
4	Bombay . . .	5	13	18	..	..
5	Madhya Pradesh . .	1	1	2	2	1
6	Punjab . . .	..	1	1	4	4
7	Rajasthan . . .	..	..	..	1	..
	TOTAL . .	11	17	28	9	5

3. The Committee is of the opinion that in order to achieve the capacity in two stages, as indicated in Table No. 9, first preference should be given to existing vegetable oil mills and vanaspati factories situated in the region. New units may, however, be developed in case the existing oil mills and vanaspati factories do

The additional capacity required to be developed in the Madras State in the first stage is 39,000 tons as shown in Table No. 9. This may be achieved by permitting the existing unit in Madras to increase its delinting capacity by 15.000 tons so as to balance the installed expeller capacity. It would also be necessary to develop two additional units in Madras State, each of annual capacity 12,000 tons of seeds.

The Committee feels that special efforts may be necessary to develop cottonseed oil industry on modern lines in the Punjab. The availability of fuzzy seeds in that State is large (192,000 tons). The bulk of the seed is fed to the cattle. The existing units in the Punjab do not delint or dehull the seed. The cake produced by crushing fuzzy seed is used for cattle feeding. Cattle owners will have to be educated in regard to advantage of feeding cake obtained from delinted seeds. The Committee is of the opinion that time besides effort, would be needed for development of the industry in the Punjab. New capacity in the Punjab has therefore been planned in two stages as shown in Table No. 9.

4. Preparatory machinery which is not yet fabricated in the country will have to be imported for the proposed expansion. This would involve foreign exchange at the rate of nearly Rs. 6 lakhs per unit.

The total foreign exchange requirements for the development envisaged in the first stage would approximately be as follows:—

	Rs. in lakhs
(*i*) Foreign exchange required for 9 units to be set up during the 1st stage as per table No. 10	54
(*ii*) Foreign exchange required for the unit in Madras for balancing delinting and expeller capacities . .	6
(*iii*) Foreign exchange required for the 17 units already licensed under Industries (Development and Regulation) Act.	102
TOTAL Rs. .	162 lakhs or roughly 1·6 crores.

The above amount is exclusive of oil expellers which may be procured from indigenous sources. The Committee is of the opinion that there is full justification for sanctioning the required foreign exchange of about Rs. 1·6 crores as cottonseed oil industry can earn considerable foreign exchange directly by the export of cottonseed oil and oil cakes and indirectly by releasing groundnut oil for the export market by taking its place in the manufacture of Vanaspati, soap etc.

5. *Organisation on Cooperative lines.*—Government of India while considering the recommendations of the Oil Seed Crushing Industry Enquiry Committee (1956) issued a resolution that "cottonseed industry should be developed on cooperative lines exclusively, so that growers may get a better return. Schemes to develop the

industry on cooperative lines may be framed". The Committee has considered this resolution and is strongly of the opinion that new entrepreneurs, vanaspati factories and existing oil mills should not be prevented from setting up cottonseed oil mills. The organisation of cotton growers and cotton ginners on cooperative lines is however desirable in order to facilitate the supply of cottonseed to the crushers at reasonable parity prices. The Committee urges that the Government of India may reconsider their previous resolution and while every encouragement may be given to the organisation of cooperative cottonseed oil mills, existing oil mills, now entrepreneurs and vanaspati factories should be allowed to instal cottonseed oil mills on modern lines at approved locations.

CHAPTER 6.

PROCESSING OPERATIONS.

Storage of cottonseeds.—Manufacturers of cottonseed oil in India do not generally keep large stocks of cottonseed, since their operations are mainly seasonal. The storage of cottonseed is not therefore an important problem as is the case in the U.S.A.

2. *Processing Technique.*—The standard processing technique starts with pre-cleaning the seed, before it is put through the delinting machine which consists of a series of circular saws mounted on a horizontal revolving shaft. The delinting machine removes the short fuzzy fibres known as linters. The seed is then conveyed to the huller which separate the hulls and the kernels. The kernel is cooked and then crushed. There are three methods adopted, for recovering oil from cottonseed *viz.* hydraulic press, expellers and solvent extraction. The hydraulic press is now being gradually replaced by expellers in the U.S.A. Solvent extraction method is of more recent introduction. This process is well suited to materials with relatively low oil content. Delinted and decorticated cottonseed cake is flaked and directly solvent extracted. In the U.S.A. a modified process which is a combination of expeller pressing and solvent extraction is now commonly employed. In this process, the cottonseed kernel after separation of hulls and cooking, is pre-pressed in an expeller which yields oil cake with an oil content of about 10%. The cake is then fed to the flaking rolls and treated in the solvent extraction plant.

Two or three units in India are at present planning to set up solvent extration plants exclusively for the treatment of cottonseed. Experimental work has been done by the Department of Chemical Engineering, Indian Institute of Technology, Kharagpur, on the use of different types of solvents under different operating conditions. Investigations have also been carried out on the alcohol extraction of cottonseed at the Central Food Technological Research Institute, Mysore. The method, as reported, consists in delinting cottonseed and treating the crushed kernel with ethyl alcohol at a temperature of about 100°C, under pressure. The kernel is pre-dried to prevent dilution of the solvent. The batch extraction is carried out in three stages. The desolventised and dried cottonseed meal is obtained as a fine yellowish powder, free from gossypol. It is rated as high class cattle feed. The extracted oil is said to be of a very light colour and suitable for edible purposes. It may be further refined and deodorised if necessary.

The Central Food Technological Research Institute, Mysore claims that alcohol extraction of cottonseed results in an oil of light colour as compared to the dark oil obtained by the usual commercial hexane extraction. The Committee understands that there is no commercial solvent extraction plant based on the use of alcohol as solvent, at present in operation in the country. The Central Food Technological Research Institute has suggested that Government should set up a semi-commercial plant based on alcohol in a suitable cotton growing area so that it may serve as a model for the industry. The Committee appreciates the advantages of using an indigenous solvent. The committee further understands that the details of alcohol extraction method are already being examined by a Committee under C.S.I.R.

2. *Refining of cottonseed oil.*—(i) Crude cottonseed oil is too dark in colour and has to be refined before being used for edible purposes or for hydrogenation. The crude oil is not amenable to ordinary methods of refining. The National Chemical Laboratory, Poona has evolved a simple process for refining crude cottonseed oil which is reported to yield a product of very pale colour. The National Chemical Laboratory has also studied the effect of different speeds of agitation during refining on the quality of the oil, particularly its colour. It has been found that increasing the rate of agitation during the process gave an oil of pale colour. Messers Sundatta Foods & Fibres Ltd., Hubli have confirmed that different speeds of agitation during the refining process have a definite bearing on the quality of the oil particularly colour. Very high speeds for agitation as recommended by National Chemical Laboratory may not ordinarily be feasible and easily arranged in plant scale operations. M/S. Sundatta Foods & Fibres Ltd., have tried several batches with speeds ranging from 30 to 100 r.p.m. and have observed that higher speeds yields an oil of relatively higher colour, other conditions remaining the same. They could not use speeds over 100 r.p.m. on account of limitations of their neutralising vessels.

(ii) Work has also been done on the refining of cottonseed oil at the Oil Teachnological Institute, Anantapur. It has been found that (a) the method of directly crushing whole seed as adopted by a number of Indian millers results in the production of darker grades of oil which is more difficult to refine and gives higher refining losses; (b) by giving preliminary treatment to the crude oil before alkali refining, Phosphatides to the extent of 0·6 to 2·4% on the weight of oil can be recovered; (c) by using certain chemicals in small quantities such as phosphoric, salicylic, citric and oxalic acids in combination with sodium carbonate and tetrasodium pyro-phosphate during refining, the refining losses could be reduced upto 2%; (d) dry refining method appears to give better results than the wet method for cottonseed oil; (e) re-refining of cottonseed oil is also necessary to reduce the colour to the acceptable standards for use in food industries; (f) Tonsil Optimum, Tonsil AC and Fulmont 711C gave the best results for bleaching the refined oil.

(iii) The Central Food Technological Research Institute, Mysore, has also carried out work on refining and bleaching of cottonseed oil. According to this Institute, alkali refining of crude cottonseed oil yields an oil with a light colour Lovibond units Red 10·0 Yellow

The Central Food Technological Research Institute has also carried out investigations on the stability and keeping quality of crude as well as refined cottonseed oil and has come to the conclusion that crude cottonseed oil is more stable when stored in glass containers. This might be due to the presence of gossypol which possess anti-oxidant properties. Refined cottonseed oil, was not however found to be stable because of the absence of gossypol which is removed during the process of refining. The Institute has found that addition of anti-oxidant like B.H.A. at the rate of 0·02% to refined and bleached cottonseed oil stored in metal containers, did not prevent the development of paroxides.

(iv) Investigational work has been done on refining of cottonseed oil under one of the C.S.I.R. Research Schemes in the Department of Chemistry, University of Delhi, under the guidance of Dr. T. R. Seshadri. A standard process has been developed for the refining of cottonseed oil. This process is based on the formation of an oil-insoluble complex which gossypol and related pigments present in crude cottonseed oil make with borax and allied chemicals. These complexes may be removed prior to alkali treatment or may be drained along with soap stock. The treated oil becomes free from pigment as shown by ultra-violet absorption measurement. Pilot plant experiments have been carried out in Shri Ram Research Institute, Delhi on the refining of cottonseed oil by this process and the following advantages have been claimed:—

1. Completely eliminates gossypol and allied pigments.
2. Cuts caustic soda consumption by at least 50%.
3. Reduces refining losses by at least 50%.
4. Yields good quality soap stock, that can easily be used for both toilet and washig soap manufacture.
5. Makes refining operation independent of the previous history of oil and seeds used for extracting the same.
6. Reduces refining time by 30%.
7. Enables isolation of gossypol in a concentrated form.
8. Does not call for any additional equipment or excess modification into the existing plants for oil refining and vanaspati manufacture.
9. The process is simple and can easily be adopted.
10. Over-all refining cost is reduced by at least 50%.

(v) The Committee has examined the question of the installation of continuous refining plants and is of the opinion that this process is much more efficient than batch refining. It is recommended that Government may permit the import of continuous refining plants by parties who are interested in putting up such plants. A continuous refining plant would cost nearly Rs. 6·5 lakhs as against in the U.S.A. by the contrifugal refining process. The initial investment in setting up a contrifugal refining plant is heavy and is beyond the means of a small-scale crusher in this country. Centrifugal refining plants are only suitable for large-scale crushers who handle 75 to 100 tons of cottonseeds per day. On account of these considerations, it would be desirable to establish only a few centrifugal plants at places like Bombay, Madras and Amravati to process crude cottonseed oil produced by smaller units. Such plants would also give an impetus to idle vegetable oil mills to take up crushing of cottonseeds, and would also build up a trade in crude cottonseed oil in India as is the case in the U.S.A. and other countries.

(vi) The Committee understands that in case crude oil is refined within a short period, there is very little danger of fixation of colour. The installation of central centrifugal refineries would be helpful in reducing the period between the extraction of the oil and its refining. Large-scale cottonseed oil mills in the organised sector who crush 75 to 100 tons of cottonseeds per day could instal their own continuous centrifugal refining plants and market refined and de-odorised cottonseed oil for edible use or as raw material in the manufacture of Vanaspati. While advocating the setting up of centrifugal refining units under certain circumstances, the Committee would like to emphasise that the existing kettle refining process, if carried out on a scientific basis would also give satisfactory results, though the oil losses would be somewhat higher.

4. *Investment and yield.*—Particulars regarding the investment necessary to set up a modern cottonseed oil plant having an installed capacity of 60 tons a day in terms of cottonseed are given in Appendix No. 5. Percentage yields of different products have also been indicated in this appendix. A total capital investment of Rs. 18 lakhs will be necessary for such a project.

The yield of different products would be as follows:—

(*i*) Linters 1st Cut	2%
(*ii*) Linters 2nd cut	6 to 6½%
(*iii*) Decorticated cakes	45%
(*iv*) Oil washed	12½%
(*v*) Hulls	25½%
(*vi*) Soap Stock	2·7%
(*vii*) Manufacturing loss	6½%

5. *Technical Problems.*—One of the main reasons which retarded the development of cottonseed oil industry in the past is the lack of full knowledge of the processing technique involved in the manufacture of cottonseed oil on modern lines and also the utilisation of cottonseed products like linters, hulls and oilcakes. The Committee feels that technical information should be made available

to the industry and also to those who propose to start new undertakings. There are several technical laboratories in the country which are engaged in investigations on oils and oil seeds. These laboratories would be in a position to furnish technical information to the industry. It is, however, necessary that the work done in different institutes should be compiled and coordinated and duplication of work should be avoided as far as possible. The Committee is of the opinion that all the technical problems which are faced by the Cottonseed oil industry may be passed on to the Council of Scientific and Industrial Research for immediate solution. This would be the best way of coordinating work in the light of the needs of the industry.

CHAPTER 7

Cotton Linters

Cotton linters are the short fibrous material adhering to cotton seed after ginning. Linters are removed from the seed after suitable cleaning by delinting machines. This can be effected in one step to recover the type of fibre known as mill-runs. More generally it is done in two stages. In the first step, longer linter fibres known as firstcuts are obtained and then in the second step, the remaining fibres are removed as second-cuts. The average annual production of linters in the U.S.A. is over 300,000 tons. The mill-run and the first-cut linters are used for bedding, automobile batts and pads, mattresses, cushions and furniture upholstery and surgical dressings. The second-cut linters are processed by "bleachers" to linter pulp or chemical cotton for use in the manufacture of rayon, plastics, films, lacquers, explosives, high grade paper and plastics filler.

2. In India there is hardly any demand for first-cut linters on account of the relative abundance of cotton mill waste, which is superior in many respects to linters for non-chemical uses. Prior to 1954, there was no consumption of linters in the chemical industry. The present annual production of linters in India is of the order of 1000 tons. At present the acetate rayon industry is able to utilise 1,000 tons of indigenous second-cut linters. The standard of quality of linters produced needs improvement, for larger utilisation in the consuming industries. The progress made in the development of the cellulose industry in the country now provides considerable scope for development of the cotton linter industry. The principal manufacturers for which cotton linter pulp would serve as raw material are:—

(1) Cellulose acetate for rayon yarn;

(2) Cellulose acetate flakes for plastic moulding powder;

(3) Cellulose tri-acetate for photographic film;

(4) Low viscosity nitro-cellulose in lacquers for surface coatings and moisture proffing cellophone;

(5) Industrial nitro-cellulose for coating leather cloth, making celluloid and manufacturing explosives;

(6) Carboxy methyl cellulose;

(7) Filler for U.F. plastic moulding powder;

(8) High tenacity tyre cord rayon;

(9) Viscose continuous filament yarn and staple fibre;

(10) Transparent viscose film.

The general picture of anticipated production of these items by 1961 and the corresponding requirements of linters or pulp would be somewhat as follows:—

TABLE NO. 11

Item	Production 1961		Requirement Linters/pulp	
1. Cellulose acetate for rayon . . .	8	million lbs.	2000	tons linters
2. Acetate flakes for plastics moulding powder	1·3	,,	400	,,
3. Tri-acetate for photographic film .	2	,,	600	,,
4. Nitrocellulose for leather cloth, celluloid and explosives			400	,,
5. Low viscosity nitrocellulose for lacquers	0·7	,,	250	,,
6. Carboxy methyl cellulose . . .	0·3	,,	600	,,
7. Filler for U.F. plastic moulding powder	1·3	,,	250	,,
8. High tenacity tyre cord rayon , . .	4·0	,,	2000	,,
9. Viscose continuous filament yarn .	64·0	,,	32000	,, pulp
10. Staple fibre	48·0	,,	24000	,,
11. Transparent viscose film . . .	4·0	,,	2000	,,

It will be seen that the linter requirements for cellulose acetate, cellulose nitrate, carboxy methyl cellulose, urea plastic filler and high tenacity tyre cord rayon are of the order of 6500 tons.

Wood pulp is the preferred material for the normal viscose continuous filament yarn and staple fibre. The viscose rayon industry import all the requirements of pulp in sheet form at Rs. 1,100 per ton. With the prevailing price of linters in the country, it should be economical for this industry to use indigenous linter pulp. The existing equipment in rayon plants cannot handle loose linter pulp. This has, therefore, to be converted to sheets. The suitability of linter pulp to replace wholly wood pulp, for normal viscose fibre has yet to be investigated. The use of 20 to 25% of linter pulp along with wood pulp for normal viscose fibre and cellulose film should however present no problems; but on the other hand improve the strength of the fibre and film. On the assumption that 20% of linter pulp in sheet form will be used for normal viscose, filamont, staple fibre and cellulose film, 11,000 tons will be taken up by these industries. This could be processed from 13,000—14,000 tons of linters. The Committee feels that the cellulose industries in the country will have been sufficiently developed by 1961 to utilise as much as 20,000 tons of second-cut linters after refining and bleaching.

3. It is well known that fuzzy American type of seeds yield a much higher percentage of linters than the desi variety. The Committee therefore recommends that active steps should be taken to expand the cultivation of the fuzzy variety of cotton seeds, containing higher percentage of linters.

4. Ginning of cotton is done in India by roller as well as saw gins. The pros and cons of these processes are being examined by a sub-committee of the Indian Central Cotton Committee.

5. Delinting of 480,000 tons of fuzzy seeds proposed to be crushed, would result in the production of nearly 24,000 tons on the basis of a most conservative estimate of 5% recovery of linters. The Committee considers it best to organise linter production on the basis of "first-cut" and "second-cut" in view of the fact that the "second-cut" is the most suitable raw material for producing chemical cotton. With a view to assess the quality of linters, the Indian Central Cotton Laboratories have chemically purified linters by boiling under pressure, bleaching and scouring. It has been found possible to get from second cut linters, pulp analysing 99% Alpha cellulose with ash less than 0·1%. This should be suitable for all the chemical cotton consuming industries. The acetate rayon industry is already utilising indigenous linter pulp. The pulp produced has also been found to conform to nitration grade.

6. In the production of 16,000 tons of second-cut linters suitable for linter pulp, there will result 8,000 tons of first-cut linters for which sufficient market in the country does not exist in view of competition from textile mill waste. The major outlet for first-cut linters would, therefore, be export and with the abolition of the export duty on linters, such markets could easily be developed for export of 8,000 tons of first-cut linters.

7. The Committee is of the opinion that the manufacturers themselves or a central agency like the State Trading Corporation may collect the first-cut linters for export. It has been shown in Chapter 5 that the cost of the preparatory machinery in respect of the new units required to be set up for immediate development of the unit industry has been estimated by the committee at around Rs. 160 lakhs. The foreign exchange saving on account of use of indigenous linter pulp in place say of 10,000 tons of imported wood pulp for normal viscose fibre would be of the order of Rs. 110 lakhs per year. The export of 8,000 tons of first-cut linters would earn foreign exchange to the tune of Rs. 32 lacs per year. As against this there would be foreign exchange expenditure of only Rs. 160 lakhs on account of import of delinting machinery and Rs. 40 lakhs for the chemical pulp plant which could process the linters to chemical cotton. Further the committee understands that suppliers of dilinting machinery would be willing to sell equipment on barter basis, *i.e.*, equipment being paid for by linters produced. The Committee considers that the import of delinting plants on this basis may also be examined for developing linter production without foreign exchange expenditure on the import of plant and equipment.

In the processing of linters to chemical cotton, the foreign matter is first removed and the linters are treated in a digester with many times its weight of dilute caustic soda solution. In digestion, the temperature, pressure, time and quantity of the materials are controlled to obtain uniform cooking. After the digestion is complete, it is freed of the spent digestion liquor. The linter stock is then bleached in multiple stages, using a pre-determined amount of chlorine at controlled pH, temperature and time. Between the bleaching steps, the pulp is subjected to frequent thorough washes, with high purity water. The purified cellulose is dried in loose form or the dilute slurry is passed on the paper machine and removed in the form of rolls or cut sheets.

8. The selection of linters for making chemical cotton is an exacting task in view of the quality of linters from different sources. The Committee feels it will be advantageous if linters from all the delinting plants are graded so as to meet the varying specifications of the consuming industries. In this respect the pulping plants will need the cooperation of the cottonseed millers. The Committee is of the opinion that production of six principal types of chemical cotton will have to be standardized:—

(i) Viscose grade.
(ii) Acetylation grade, particularly Tri-acetate for Photographic film.
(iii) Nitration grade.
(iv) Etherification grade.
(v) Plastic filler .
(vi) High grade writing paper.

Each lot of linters has to be evaluated in the linter pulp plant chemically and physically. The small scale processing of raw linters to the finished cellulose derivatives has to be carried out to check the quality of linter. Out of this experience, linters can be selected or graded which will yield for the different industries a tailor made chemical cotton of specified properties e.g., absorbency (sheeted pulp for Viscose); fibre length (for paper), colour (not important for explosives) low ash, iron, manganese contents and in varying viscosities.

9. The following figures give the analysis of commercially available second-cut indigenous linters as well as linters imported recently from Pakistan:—

TABLE No. 12

	Second-cut linters from Pakistan	Indigenous second-cut linters		
		1st Sample	2nd Sample	3rd Sample
Moisture	5·47	6·88	7·50	7·42
Ash	1·01	2·41	1·78	1·28
Iron ppm	98	418	103	55
Silica	0·10	0·21	0·05	0·02
Alpha Cellulose	97·07	92·21	96·63	94·73
Oxy cellulose	8·78	15·50	9·83	11·52
Alpha Oxy-cellulose	88·29	76·71	86·80	83·21

CHAPTER 8

COTTONSEED HULLS AND CAKE

Cottonseed hulls are used in the U.S.A. primarily as feed for livestock. Whereas the meal provides a protein concentrate, hulls serve the purpose of roughage in the feed. A number of crushing mills in the U.S.A. market a mixture of decorticated cottonseed meal and hulls. Considerable quantities of hulls were also used during the last War in the U.S.A. for the manufacture of furfurol, activated carbon etc. A section of the industry represented that there is no proper market in India for hulls and accumulated stocks have to be burnt in boilers. The Committee understands from one of the important crushers that disposal of hulls in India by cottonseed oil mills equipped with delinting machinery did not present a problem any longer. The main difficulty however was in creating a market for decorticated cottonseed cake as cattle feed. It was reported that this difficulty did not exist in Madras. Hulls are sold at Rs. 1/8/- to Rs. 2 per maund and used for cattle feeding purposes. M/s. Sundata Foods and Fibres Ltd., Hubli utilise hulls in the manufacture of composite ration in the form of pellets. The Committee is of the opinion that hulls may be used as one of the ingredients in compounded feed for cattle.

2. **Cottonseed cake.**—The present annual production of cottonseed cake in India both decorticated as well as undecorticated is of the order of 100,000 tons. The market in India for decorticated cottonseed cake is somewhat limited as the whole seed is preferred to the cake as cattle feed. The advantage of feeding cottonseed cake to cattle instead of whole seed has been accepted, and the necessity for the change is beginning to be appreciated by farmers. The price of cottonseed is determined by the price which the farmer is prepared to pay for it, whereas the cake has to be competitive with other cakes produced in the country. The industry is often faced with lack of parity in these prices and hence the crushing of cotton seeds becomes uneconomical. The Committee is of the opinion that farmers traditionally accustomed to use whole cottonseed would accept undecorticated cake more readily than decorticated cake. The production of undecorticated cake need not, therefore, be discouraged as the cake is the nearest substitute to cottonseed in protein value. At the same time, the Committee realises that from the scientific and industrial point of view it is necessary to produce decorticated cake as by decortication and delinting, higher yields of oil are obtained and its quality is improved.

3. The present production of cottonseeds is of the order 1.6 million tons and in accordance with the targets fixed in the Second Five Year Plan, this is likely to increase to at least 1.8 million tons. Despite the plan suggested by the Committee for crushing of seeds, substantial quantities of the whole seed would still be available for the conservative farmer who would not take to the cake. The Committe feels there is need for intensive propaganda amongst farmers

in favour of undecorticated and decorticated cottonseed cake. The Committee is of the opinion that the following steps may be taken in order to encourage the use of cottonseed cake for cattle feeding purposes:—

(a) Manufacture of balanced ration for feeding cattle consisting of decorticated cottonseed cake, hulls, rice bran, salt etc. should be encouraged;

(b) Intensive propaganda should be done through Government organisations for popularising cottonseed cake and for discouraging the use of whole seed as cattle feed. The Committee feels that workers in the Community Projects and National Extension Service Blocks should be entrusted with such work. The Planning Commission should also take necessary steps for popularising the use of cake in place of whole seed.

(c) The Rural Broadcasting Programme of the All India Radio should regularly emphasise the nutritive value and economic aspects of the use of cottonseed cake and hulls as cattle feed particularly in Punjab, Saurashtra, Madhya Bharat and Madras where cottonseed is imported from other States for feeding cattle.

(d) The Central Oil Seeds Committee should be requested to carry propaganda in favour of the use of cottonseed cake for cattle feeding and utilise a part of the cess funds for this purpose.

(e) Government dairies and farms should use cottonseed cakes instead of whole seed and demonstrate to the farmer its value and also keep this in view while inviting tenders.

The industry pointed out to the Committee that uniform standards should be laid down, for decorticated and undecorticated cake required by the Army Purchase Organisation, Dairy farms etc. The Committee feels that the Indian Standards Institution should look into this matter in consultation with the industry. The Army Purchase Organisation should also adopt uniform standards for cottonseed cake as finalised by the Indian Standards Institution.

CHAPTER NO. 9

INDUSTRIAL USE OF COTTONSEED OIL & ITS SOAP STOCK

As pointed out in an earlier chapter, raw cottonseed oil cannot be used for any purpose unless it is refined. It also shows much higher refining ratio as compared to other oils Soap stock is an inevitable by-product in the production of cottonseed oil. Cottonseed soap stock is also a dark material and contains 8 to 20% of neutral oil and 20% to 25% of mixed fatty acids mostly as soap. The cake is utilised to some extent for making cheap black soap and/or acid oil, but the material produced is not readily marketable and fetches a very low price. The Committee has examined this problem and feels that the only possibility is to convert the soap stock into mixture of fatty acids of light colour by high temperature high vacuum distillation. It should be possible to dispose of the resulting pitch for road surfacing. It was suggested to the Committee that there should be plants in some centrally placed locations for the manufacture of fatty acids where soap stock from a number of adjoining oil mills could be pooled and processed. The Committee agrees with the above suggestion and is of the opinion that Government should encourage the establishment of such centrally located plants for recovery of fatty acids from soap stock. The Committee, however, realises that the distilled fatty acids are likely to darken on storage. On the basis of refining of 60,000 tons of cottonseed oil, about 6000 tons of fatty matter in the form of soap stock will be available per year. At least 8000 tons of soap could be obtained from it. The fatty acids would be better suited than oils for the production of soap, particularly by the cold or semi boiled process. By the use of fatty acids instead of oil, the soap is free from glycerine which causes sweating in the soap. The soap is also practically free from unsaponified matter which imparts instability to soap. Low priced soda ash could be used to substitute caustic soda to a great extent, and the fatty acids are saponified more quickly than the corresponding oils thus in saving in fuel, power etc.

2. It was suggested to the Committee that the use of certain proportion of cottonseed oil should be made compulsory in the manufacture of soap since such oil could replace groundnut oil which is edible even in crude form. The Committee feels that cottonseed oil as such or hardened can satisfactorily be used in the manufacture of washing soap. Some of the soap manufacturers are already using cottonseed oil as a soft oil in soap making. Approximately 3,000 tons of washed cottonseed oil are used in the Punjab for the manufacture of washing soap. The Committee has come to the conculsion that the use of cottonseed oil in soap manufacture does not present any problem from the technical angle. One of the soap manufacturers informed the Committee that after hydrogenating cottonseed oil to 45° m.p. it can be advantageously used to the extent of 30% in the manufacture of washing soap of good quality. The Committee is of the opinion that the hydrogenation of cottonseed oil for industrial purposes should also be encouraged. Partially hardened cottonseed

could be a better soap making material than partially hardened groundnut oil on account of appreciable content of Palmitic acid. It is also possible to produce a tallow substitute from cottonseed oil. The Committee, therefore, feels that cottonseed oil either as soft oil or partially hardened oil or fully hardened oil could go into the soap pan at least for the manufacture of washing soap.

3. The Committee is of the opinion that soap manufacturers in the organised sector could be asked to use at least 5% of cottonseed oil as soft oil in the manufacture of washing soap, as it would not be possible for all soap manufacturers to obtain hardened cottonseed oil. The production of washing soap in the organised sector is of the order of 90,000 tons and the use of 5% cottonseed oil as soft oil in washing soap manufacture would lead to the utilisation of as much as 3,000 tons of cottonseed oil.

4. The mixed fatty acids obtained by distillation would also find a market in the rubber industry, in the manufacture of greases, textile auxiliaries and synthetic detergents. The fatty acids obtained from hydrogenated cottonseed oil of low iodine value could also be utilised for cosmetic manufacture.

CHAPTER 10

UTILISATION OF COTTONSEED OIL IN THE MANUFACTURE OF VANASPATI AND REFINED OIL.

Unlike other vegetable oils, cottonseed oil is inedible in the crude form. This is due to the strong characteristic odour of the oil and also due to its dark reddish brown colour derived from gossypol and other deep-coloured pigments present in the seed. These defects can, however, be overcome by the process of refining, bleaching and deodourising. Refined cottonseed oil compares very favourably with other refined vegetable oils. Refined cottonseed oil on hydrogenation yields a product which is comparable in every way to shortening or vanaspati manufactured from other oils. Out of the total domestic consumption of cottonseed oil in the U.S.A. about 22% is used for shortening, 20% for margarine, 52% for salad oil and the balance 6% for other edible and non-edible purposes.

2. Although India is the world's second largest producer of cottonseed next only to U.S.A., only a negligible quantity of cottonseed has been crushed for oil so far and even this has not found much favour in the Vanaspati industry. The dark colour of Indian cottonseed oil has been responsible for its limited use in the manufacture of Vanaspati. The increased adoption of modern methods by cottonseed crushing mills would yield an oil of improved quality. Cottonseed oil is the only vegetable oil in India which although inedible in crude form could be made edible by refining and hydrogenation treatment. It is therefore logical to promote its use as a raw material in the manufacture of Vanaspati thereby vastly increasing the total oil resources of the country and help to release a corresponding quantity of groundnut oil for export.

3. Even as it is cottonseed oil is one of the only three vegetable oils which have been statutorily permitted under the Vegetable Oil Product Control Order 1957 to be used as raw material in the manufacture of Vanaspati, the other two being groundnut and sesame oils. However, Vanaspati manufacturers have relied mainly on groundnut oil so far, as the main raw material for their product. This is because, apart from being one of the cheapest edible oils in the country and available in abundance, groundnut oil presents the least difficulty in regard to processing. Unlike cottonseed oil its initial colour is relatively light, its flavour is mild and free fatty acid content low. It was only when groundnut oil was in short supply in 1953-54 that Vanaspati manufacturers took to the use of cottonseed oil and a few other oils in appreciable quantities. As much as 8532 tons of cottonseed oil were used in the manufacture of Vanaspati in 1953. But with the subsequent improvement in the groundnut oil supply position, other oils once again gave way to groundnut oil. It is felt that steps which are now being taken for developing cottonseed crushing industry so as to make available increasingly larger quantities of cottonseed oil of satisfactory quality at reasonable price,

should go a long way to reverse the present dependence of the vanaspati industry on groundnut oil alone. This would also enable cottonseed oil to find its rightful place alongside groundnut oil.

4. The Vanaspati industry has been steadily expanding during the last three decades, as may be seen from the following figures:—

TABLE No. 13

Year	Production of Vanaspati in tons
1930	298
1935	17,090
1940	65,658
1945	1,32,627
1950	1,72,437
1955	2,60,850
1957	3,01,354
1958 (Jan-June)	1,59,077

5. The quantities of different types of vegetable oils used by the Vanaspati industry during the last six years are given in the following table:—

TABLE No. 14

Details	1952	1953	1954	1955	1956	1957
1	2	3	4	5	6	7
1. *Oils used* :						
(*a*) Groundnut oil .	2,09,187	1,82,926	2,36,156	2,81,398	2,73,003	3,05,492
(*b*) Sesame oil .	12,475	15,682	15,275	16,249	14,919	17,348
(*c*) Cottonseed oil .	4,362	8,532	5,063	444	1,159	3,943
(*d*) Other oils .	1,744	20,769	5,078	1,824	1,723	4,075
	2,27,768	2,27,909	2,61,572	2,99,915	2,90,804	3,30,858
2. Percentage of cotton seed oil used, to total oils . .	1·9%	3·7%	1·9%	0·15%	0·4%	1·2%

6. A serious beginning in regard to the systematic use of cottonseed oil in the manufacture of vanaspati, was made following an appeal made by the Union Minister for Industry, Sri Manubhai Shah at the meeting of Vanaspati Manufacturers and others convened by the Ministry of Commerce and Industry on 17th August 1957. The

Committee is glad to note that member factories of the Vanaspati Manufacturers Association of India have now voluntarily agreed to use cottonseed oil in their product to the extent of 2½% (minimum) of their over-all vegetable oil requirements during 1958 and 5% during 1959 irrespective of price considerations. They have also agreed to use 7½% during 1960 and 10% in 1961 provided the price of cottonseed oil *vis-a-vis* groundnut oil is found to be satisfactory. The Committee has been informed that the Vegetable Oil Products Controller for India has also addressed such of the vanaspati factories as are non-members of the Vanaspati Manufacturers Association and advised them to use cottonseed oil to the same extent as agreed to by the members of the Vanaspati Manufacturers Association.

7. The Committee also considered a proposal regarding the manufacture of a special brand of Vanaspati for the use of Defence Services containing 25—50% of cottonseed oil and decided that the production of such brand may be encouraged in view of the possibility of larger consumption of cottonseed oil in this way. It was pointed out by the industry that it may be necessary to add carotene in such a brand in order to improve the colour. The Committee feels that Government may consider the question of permitting the use of edible colours in special brands of vanaspati containing 25 to 50% of cottonseed oil as such a step would encourage increased consumption of cottonseed oil.

8. The Committee appreciates the voluntary undertaking given by the Vanaspati industry to use increasing quantities of cottonseed oil and its products and is of the opinion that in the circumstance, there would not be any necessity of making such addition compulsory at this stage. Moreover the availability of cottonseed oil being seasonal in character, such compulsory enforcement in respect of every batch of vanaspati may present some practical difficulties. The Committee is glad to observe that Vanaspati industry has already started implementing its undertaking in right earnest as will be seen from the figures of cottonseed oil utilisation during January to June, 1958 shown in the statement below:—

TABLE No. 15

Sl. No.	Name of month	No. of Vanaspati factories working	Production of vanaspati (in tons)	Raw oil used (in tons)	Cotton seed oil (in tons)	Number of Vanaspati factories which used cottonseed oil					Overall % of cotton seed oil used
						Below 2 %	2-4 %	4-6 %	6-8 %	8-10 %	
1	January '58 .	37	26,281	26,925	799	3	9	..	..	..	
2	February .	37	24,968	25,592	959	3	10	5	2	1	
3	March .	37	29,167	29,071	1048	2	15	5	2	..	
4	April .	38	26,115	26,874	995	4	14	9	1	1	
5	May . .	37	27,905	28,419	1205	4	15	5	3	..	
6	June .	37	24,505	25,396	1162	3	10	6	4	2	
	TOTAL .		1,58,940	1,62,277	6168						3·8%

9. It has been represented to the Committee that the increased utilisation of cottonseed oil in the manufacture of Vanaspati is dependent on the following three factors:—

(a) Availability of cottonseed oil.
(b) Quality of the oil.
(c) Price of cottonseed oil *vis-a-vis* Groundnut oil.

(a) *Availability of cottonseed oil in sufficient quantities.*—As already indicated earlier, the production of Vanaspati has been steadily increasing from year to year and a target of 400,000 tons has been fixed by the Planning Commission for achievement by 1960-61 based on an anticipated annual increase of about 25,000 tons per year during the Plan period. The following statement gives the estimated requirements of vegetable oils during the next 4 years and also the estimated consumption of cottonseed oil by the Vanaspati industry, on the basis of 2½% utilisation in 1958, 5% in 1959, 7½% in 1960 and 10% in 1961.

TABLE No. 16

Year	Production of Vanaspati (tons)	Approximate requirements of vegetable oils (tons)	Percentage of cottonseed oil to be used (tons)	Total quantity of cottonseed oil required (tons)
1958	3,25,000	3,52,000	2½%	8,800
1959	3,50,000	3,80,000	5%	19,000
1960	3,75,000	4,06,600	7½%	30,450
1961	4,00,000	4,33,000	10%	43,300

Doubts have been expressed whether there would be sufficient development of cottonseed oil industry in the near future in order to cope with the anticipated increasing requirements of the Vanaspati industry during the next few years. The present position of cottonseed oil industry has already been examined in Chapter 3. Suggestions have also been made for the development of additional capacity in Chapter 5.

There are 41 Vanaspati factories in India in production which may be grouped in the following 4 zones, so as to evolve a regional pattern for the supply of cottonseed oil to the Vanaspati industry:—

Zone No.	Region
I	Andhra, Madras, Mysore and Kerala.
II	Bombay, Madhya Pradesh and Rajasthan.
III	Uttar Pradesh, Punjab and Delhi.
IV	West Bengal, Bihar, Assam and Orissa.

The number of vanaspati factories and the total consumption of vegetable oils in different zones during 1957 are given below:—

TABLE No. 17

Zone	Total number of vanaspati factories		Consumption of vegetable oils in 1957
1	2		3
I	11		35,357
	Andhra	2	
	Madras	4	
	Mysore	4	
	Kerala	1	
II	15		132,723
	Bombay	14	
	Madhya Pradesh	1	
III	8		97,871
	Uttar Pradesh	4	
	Punjab	2	
	Delhi	2	
IV	7		64,932
	West Bengal	6	
	Bihar	1	

The following table gives the position regarding the estimated availability of cottonseed oil in different zones during 1958, 1959, 1960 and 1961:—

TABLE NO. 18

Year	Zone No.	Total estimated consumption of vegetable oils in the manufacture of vanaspati	Quantity of cottonseed oil required	Estimated availability of cottonseed oil in accordance with the plan for immediate development of the industry
1	2	3	4	5
				Tons
1958 2½% cottonseed oil to be used.	I	38,000	950	4,025
	II	140,000	3,500	7,250
	III	106,000	2,650	Nil
	IV	68,000	1,700	Nil.
TOTAL		352,000	8,800	11,275

1	2	3	4	5
1959 5% cottonseed oil to be used.	I	41,000	2,050	6,900
	II	150,000	7,500	11,750
	III	115,000	5,750	3,500
	IV	74,000	3,750	
TOTAL . .		380,000	19,000	22,150
1960 7½% cottotseed oil to be used.	I	45,000	3,300	16,275
	II	163,000	12,250	14,500
	III	120,000	9,000	6,500
	IV	78,000	5,900	..
TOTAL . .		406,000	30,450	37,275
1961 10% cotton seed oil to be used.	I	48,000	4,800	17,775
	II	175,000	17,500	25,962
	III	128,000	12,800	8,000
	IV	82,000	8,200	..
TOTAL . .		433,000	43,300	61,737

(b) *Quality of cottonseed oil to be used in the manufacture of Vanaspati.*—The quality of cottonseed oil is an important factor governing the increased utilisation of this oil by the vanaspati industry. The chief consideration in the utilisation of cottonseed oil in the manufacture of Vanaspati is that the colour and keeping quality of the finished product, should not be jeopardised. The colour of cottonseed oil depends upon the quality of the seed and the method of harvesting, storing and crushing it. It has been found by experience that delinted seed should be crushed as early as possible, otherwise the stored delinted seed gives more colour to the oil and also retains more colour in the neutralised oil. Such oil is also found to give higher losses under similar treatment as compared to oil obtained from unstored delinted seed. The attention of the Committee was drawn to the fact that full requirement of bleaching earth and activated carbon of Vanaspati factories for refining cottonseed oil are at present not being allowed. The Commitee recommends that the import of bleaching earth and activated carbon for refining cottonseed oil should be allowed in full till indigenous products of satisfactory quality are available.

Crude oil obtained from undecorticated cottonseed is almost black on account of the presence of Gossypol resins and pigments of the seeds. The normal practice in our country is to neutralise this dark coloured oil with alkali immediately after crushing. The oil so obtained is known in trade as "washed oil". In case the dark oil is not neutralised immediately, but is stored as such, the colour gets fixed and subsequent bleaching is rendered difficult. Several vanaspati factories have sometimes found that washed cottonseed oil as available at present from cottonseed oil mills is unsuitable for use in the manufacture of Vanaspati on account of defective processing.

The scientific refining of crude cottonseed oil can be done either by batch or continuous methods. As far as batch refining is concerned, it is necessary that the following precautions should be taken in order to produce a neutralised oil of good quality:—

(i) Adequate agitation to ensure good mixing.

(ii) Temperature during the caustic treatment may be kept as low as possible (60. to 70.C) to avoid colour fixation.

(iii) Sufficient excess of caustic soda solution of correct strength may be used to ensure the removal of the maximum amount, of gossypol.

The Committee enquired from the Vanaspati factories whether in view of the practical difficulties experienced in bleaching washed cottonseed oil available from the cottonseed oil mills, they would be interested in purchasing crude cottonseed oil. Most of the vanaspati factories prefer to purchase washed cottonseed oil mainly with a view to obviate the difficulty of disposing of the soap stock. The Committee is of the view that existing cottonseed oil mills should seriously explore ways and means of improving the quality of the oil produced by them and seek guidance from the Research Institutes in regard to the proper procedures to be adopted for the refining of crude oil.

The Committee recommends that the standards laid down by the Indian Standards Institution in consultation with the trade as well as the consumers should be strictly adhered to by the Vanaspati factories while purchasing cottonseed oil on a contract basis from the cottonseed oil mills.

(c) *Price of cottonseed oil* vis-a-vis *groundnut oil:*—The Vanaspati Industry has represented to the Committee that while it has no prejudice against the use of cottonseed oil in the manufacture of Vanaspati, it was essential that cottonseed oil of good quality should be available at a reasonable price in relation to groundnut oil.

The Vanaspati manufacturers have informed the Committee that the increased use of cottonseed oil to the extent of 7½ per cent in 1960 and 10 per cent in 1961 was subject to its price being favourable in comparison with that of groundnut oil. The Committee would like to emphasise that unless cottonseed prices remain at reasonably low level and renumerative outlets are provided for cottonseed cake, hulls and linters, it will be difficult for cottonseed crushers to sell the oil at a price lower than that of groundnut oil.

10. In order to popularise the use of cottonseed oil in the manufacture of Vanaspati or for edible purposes, Government of India completely abolished the excise duy on this oil in September, 1957. The step is expected to maintain a satisfactory price difference between cottonseed and groundnut oils.

11. The economics regarding the use of cottonseed oil in the manufacture of Vanaspati was one of the subjects discussed at a Technical Symposium organised by the Vanaspati Manufacturers' Association at Bombay on 18-2-1958, under the chairmanship of Shri F. G. T. Menezes, a member of the Committee. It was brought out at this symposium that the cost of processing washed cottonseed oil is Rs. 50/60 per ton higher than that for processing groundnut oil into Vanaspati. The cost of processing crude cottonseed oil would be Rs. 120/- per ton more. These figures are in relation to vanaspati if produced from 100 per cent cottonseed oil. In case only 10 per cent cottonseed oil is used, the additional cost of processing would be very much narrowed down. The Committee has been given to understand that cottonseed oil requires more hydrogen and longer hydrogenation and deodurising time than groundnut oil. The Committee is confident that large-scale production of cottonseed oil for use in the manufacure of Vanaspati will help to reduce the over-all cost of the oil. One of the main obstacles in the reduction of the price of cottonseed oil is the lack of sufficient internal market for by-products like cotonseed cake, hulls and linters. The Committee expects that the use of these by-products will develop on a larger scale in the near future and this would result in lowering the overall cost of production of cottonseed oil.

12. *Use of Cottonseed oil as edible oil.*—The use of cottonseed oil as edible oil has not developed on account of the dark colour of the oil in crude form. There is, however, scope for marketing refined cottonseed oil as an edible oil in the near future and the Committee would urge the increased marketing of refined cottonseed oil both by

CHAPTER 11

RECOMMENDATIONS OF THE *AD HOC* COMMITTEE ON COTTONSEED OIL INDUSTRY

1. *Crushing of non-fuzzy seeds.*—The crushing of non-fuzzy seeds which contain smaller percentage of linters could be advantageously undertaken in the unorganised sector by smaller units which are not equipped with delinting machinery. The Committee is of the opinion that this sector may be encouraged to crush non-fuzzy seeds. (Chapter 3, para. 1.)

2. *Fuzzy seeds.*—The objective of the industry in the organised sector should be to crush such seeds which are rich in linters (fuzzy) and at the same time have a higher oil content, it being immaterial whether they are of American or desi origin. (Chapter 3, para 3.c.)

3. *Installed capacity.*—The Committee is of the opinion that the installed capacity of cottonseed oil mills in the organised sector ought to be rated not merely by the expeller capacity but by the capacity of the delinting machinery. (Chapter 3, para 7.a.)

4. *New units recently licenced under Industries (Development and Regulation) Act.*—The Committee undersands that a number of mills licenced under Industries (Development and Regulation) Act have not yet taken effective steps to set up their units. The Committee is of the opinion that Government should review their progress at an early date and take steps where necessary to revoke licences which block up the capacity. The revoked capacity may be allotted to other applicants from the same State. (Chapter 3, para 7.a.)

5. *Speculation in cottonseeds.*—The Forward Markets Commission may keep a watchful eye on the speculative activities in the forward markets of cottonseeds so that such activities may not hinder the availability of cottonseeds for crushing purposes by pushing the prices beyond crushing parity.

The Forward Markets Commission may be also consider whether the practice reported to be adopted at Bombay of excluding the fuzzy variety of cottonseeds from tendering against forward contracts can be extended to other exchanges dealing in cottonseeds. (Chapter 4, para 3.)

6. *Fiscal Policy.*—(i) Government of India should persuade the State Governments to waive the sales tax levy on cottonseeds on special considerations or at least not to discriminate and exempt cottonseed which is fed to cattle from payment of sales tax as this step would divert more and more whole seed instead of cake for cattle feeding. The State Governments should also be requested to advise local bodies to consider the abolition of octroi duty on

(ii) Unlike other vegetable oils, there is at present no excise duty on cottonseed oil. Government of India have exempted cottonseed oil in order to give a stimulus to the crushing of cottonseeds. The Committee recomends that excise duty should not be levied on cottonseed oil for five years. The position may be reviewed thereafter. Such an announcement from the Government would help the rapid development of the industry. (Chapter 4, para 7.)

7. *Financial assistance.*—(i) Government may advise State Finance Corporations to accord high priority to cottonseed oil industry in their scheme of assistance to private industrialists. (Chapter 4, para 5.)

(ii) The Reserve Bank should be requested to advise all scheduled banks to consider the question of advancing loans on cottonseed and cottonseed products. (Chapter 4, para 6.)

8. *Transport facilities and railway freight.*—(i) The Committee recommends that the Railway Board should consider reduction of freight on movement of cottonseeds on station to station basis within 400 miles, where a crushing mill is located at or near the railway station. Such a concession will no doubt apply to cottonseed meant both for crushing as well as for cattle feeding, as it will be difficult to prevent consignments being used by the farmers as well. It is suggested that this concessional freight may be half that of the normal rate charged for groundnut in view of the fact that the percentage of oil recovered from cottonseed is hardly 50 per cent of that recovered from groundnut. (Chapter 4, para 11.)

(ii) The Railway Board should examine again the difficulties in connection with the loading of 300 maunds of cottonseed hulls in open wagons. The Industry has pointed out that it is not possible to load more than 200 maunds in each wagon, although the railways have stipulated 300 maunds and also charge freight for this quantity. Similar difficulties are also faced on the metre guage. (Chapter 4, para 12.)

9. *Import of Bleaching Earth and Activated Carbon.*—Import of Bleaching Earth and Activated Carbon should be allowed for refining cottonseed oil till indigenous products of satisfactory quality are available. (Chapter 4, para 15.) and (Chapter 10, para 9.b.)

10. *Import of Plant and Equipment.*—The proposal regarding the import of cottonseed preparatory machinery on a barter basis against cotton linters may be examined by the State Trading Corporation. The possibility of procuring preparatory machinery and continuous solvent extraction plants under the U.S. Export-Import loan fund and other Assistance programmes may also be explored by the Government. (Chapter 4, para 16.)

11. *Standards for cottonseed oil.*—Standards should be laid down for crude cottonseed oil by the Indian Standards Institution. Standards may also be prepared for cottonseed. The Indian Standards

12. *Research Problems.*—The Committee recommends that all investigational work on cottonseed and cottonseed products should be co-ordinated by the Council of Scientific and Industrial Research. (Chapter 4, para 21.)

13. *Association of the Industry.*—The Committee recommends that an Association of Cottonseed Crushers be formed to consider common problems and assess the progress of the national plan for the industry. (Chapter 4, para 22.)

14. *Future development of the Industry.*—(i) The Committee recommends a plan for the speedy development of the industry in two stages:

(a) Production on a minimum basis of 60,000 tons of cottonseed oil by the existing and licenced units and by establishing 9 additional units each of capacity 12,000 tons per annum in terms of cottonseeds on the basis of 200 working days in a year. Out of these 9 units, two should be set up in Madras, two in Madhya Pradesh, 4 in the Punjab and one in Rajasthan.

(b) The second stage would achieve a production of 70,000 tons of oil by the setting up of further 5 units of similar capacity, one in Madhya Pradesh and four in the Punjab. (Chapter 5, para 1.)

(ii) The Committee is of the opinion that in order to achieve the additional installed capacity, first preference should be given to existing regional vegetable oil mills and vanaspati factories. New units may, however, be developed in case the existing oil mills and vanaspati factories do not take to crushing cottonseed expeditiously. (Chapter 5, para 3.)

(iii) The Committee feels that special efforts may be necessary to develop cottonseed oil industry on modern lines in the Punjab. (Chapter 5, para 3.)

(iv) The Committee considers that there is full justification for incurring the foreign exchange of Rs. 1·6 crores for the immediate development of the industry. (Chapter 5, para 4.)

15. *Organisation of the industry on cooperative lines.*—While every encouragement may be given to the organisation of the industry on cooperative lines in accordance with the plan evolved by the Committee, existing oil mills, vanaspati factories and new entrepreneurs should not be prevented from setting up cottonseed oil mills on modern lines at approved locations. (Chapter 5, para 5.)

16. *Processing operations.*—(i) The Committee is of the opinion

(ii) The Committee recommends that *continuous refining plans* may be allowed to be imported as far as possible by those who wish to instal such plants, as the continuous process is more economic than batch refining process. (Chapter 6, para 3V.)

17. *Linters.*—(i) *Increased cultivation of the improved variety of cottonseed.*—Active steps should be taken by the Government to extend the cultivation of the fuzzy variety of cottonseeds in different regions of the country. (Chapter 7, para 3.)

(ii) The Committee recommends that the linter industry should be organised on the basis of production of first cut and second-cut, as the latter is the most suitable raw material for high grade chemical cotton essential for the manufacture of plastics, rayon, films, explosives, lacquers etc.

As there is no demand in the country for first-cut linters, in view of the availability of mill-waste, the first-cut may be allowed to be exported freely and to facilitate such exports, the export duty of 30 per cent *ad-valorem* which was abolished early in 1958 should not be reimposed for five years. The position may be reviewed thereafter. (Chapter 7, para 6.)

(iii) The Committee recommends that linter pulp plants may be organised at suitable places to facilitate the conversion of linters into bleached pulp for industrial purposes. (Chapter 7, para 8.)

18. *Cottonseed cake.*—(i) The Committee recommends that production of balanced ration for cattle composed of decorticated cottonseed cake, hulls, rice bran, molasses, salt etc. should be undertaken on a large-scale. (Chapter 8, para 1.)

(ii) *Propaganda.*—Intensive propaganda may be undertaken for popularising cottonseed cake through Community Development Blocks under Community Projects Administration and All India Radio. (Chapter 8, para 3.)

(iii) The Central Oil-seeds Committee should give serious attention to propagation of use of cottonseed cake instead of the whole seed by the farmer. (Chapter 8, para 3.)

(iv) The Committee recommends that Government dairies and farms should use cottonseed cake instead of whole seed. Ministry of Food and Agriculture may also advise the State Governments. (Chapter 8, para 3.)

(v) *Standards.*—The Committee recommends that uniform speci-

(vi) *Production of undecorticated cake.*—The production of undecorticated cottonseed cake need not be discouraged. Delinting of seed should however be done in all cases; hulling may or may not be done. This would facilitate the disposal of cottonseed cake. As an animal feeding stuff, undecorticated cake can replace the whole seed more readily than decorticated cake in the initial stages. (Chapter 8, para 2.)

19. *Soap stock and soap industry.*—(i) *Soap Stock.*—Plants may be established in central locations for the production of fatty acids from refinery soap-stock and Government should provide facilities for the import of plant and machinery for this purpose. (Chapter 9, para 1.)

(ii) The Committee recommends that 5 per cent of cottonseed oil may be used in the manufacture of soap. (Chapter 9, para 3.)

20. *Utilisation of cottonseed oil in the manufacture of vanaspati.*—(i) The Committee endorses the decision of the members of the Vanaspati Manufacturers Association to voluntarily use cottonseed oil in the production of Vanaspati—2½ per cent on an annual basis in 1958, 5 per cent in 1959, 7½ per cent in 1960 and 10 per cent in 1961. Cottonseed oil would be used in the manufacture of Vanaspati upto 5 per cent irrespective of the price difference between cottonseed oil and groundnut oil. (Chapter 10, para 6.)

(ii) The Committee recommends the manufacture of special brands of vanaspati for the Army containing 25 per cent to 50 per cent cottonseed oil, in view of the possibility of larger consumption of cottonseed oil in such brands. (Chapter 10, para 7.)

CHAPTER 12

CONCLUSION AND ACKNOWLEDGMENTS

The Committee would reiterate that the development of cottonseed oil industry has got a great future. The Committee lays emphasis on the development of this industry on modern lines which include cleaning of seed, delinting and hulling operations. Since cottonseed processing machinery is not yet manufactured in the country, Government should provide necessary foreign exchange to the new units which are yet to be established or to the existing ones which are keen to modernise their factories.

2. The Committee has made a number of recommendations and it is felt that unless these are implemented expeditiously, it will not be possible to achieve the desired objective in regard to the development of cottonseed oil industry.

3. The Committee is grateful to Shri Manubhai Shah, Minister for Industries, Government of India for the personal interest evinced by him in the working of the Committee and the encouragement and guidance given by him from time to time.

4. The Committee places on record its high appreciation of the efficient work done by Shri V. A. Mehta, Member-Secretary of the Committee.

5. The Committee also acknowledges the efficient services rendered by the staff particularly Shri K. Krishnankutty Menon, Stenographer, Shri C. L. Jain, Assistant, and Shri Jai Singh typist.

N. SRINIVASAN,
Chairman.

K. VYASULU,
Member.

F. G. T. MENEZES,
Member.

E. SVENDSEN,
Member.

S. H. TURNER,
Member.

A. C. CHHATRAPATI,
Member.

TULSIDAS M. VISHRAM,
Member.

G. V. SIRUR,
Member.

R. SANKARAN,
Member.

V. A. MEHTA,
Member-Secretary.

NEW DELHI;
The 27th November, 1958.

APPENDIX No. 1

MONTH-END WHOLESALE PRICES OF COTTONSEED AND COTTONSEED OIL

(Rs. per maund)

Month-end	Cottonseed		Tirupur (Karan garnni)	Cottonseed oil	
	Bombay	Abohar (Desi)		Khanna	Bombay
1956 January	11·37	12·00	11·00	43·25	44·25
February	10·75	11·37	12·12	43·00	45·50
March	12·12	13·37	9·50	51·00	62·06
April	10·87	13·50	10·00	51·50	62·12
May	10·62	14·00	10·50	N.Q.	61·62
June	11·37	14·37	9·00	53·00	54·25
July	11·50	14·75	9·00	N.Q.	50·62
August	9·62	14·50	9·00	59·00	51·37
September . . .	9·50	13·50	9·00	48·00	49·94
October . . .	9·50	11·25	N.R.	45·50	48·75
November . . .	10·25	12·25	10·50	N.R.	58·75
December . . .	10·25	12·00	9·62	49·50	55·50
1957 January . . .	11·12	13·12	10·44	54·44	62·50
February . . .	10·50	13·00	8·19	N.R.	54·12
March	11·50	..	..	51·25	53·62
April	11·87	14·25	12·75	54·75	53·88
May	12·50	14·25	13·31	57·50	56·52
June	9·87	N.R.	11·37	56·50	55·62
July	11·37	13·94	11·37	56·00	58·75
August	12·25	N.R.	11.50	N.Q.	53·62
September . . .	11·25	13·50	10·19	51·50	51·87
October . . .	11·00	15·62	N.R.	2·00	53·62
November . . .	11·50	13·25	N.R.	50·00	53·75
December . . .	10·56	13·00	N.R.	49·00	53·25
1958 January . . .	10·23	12·75	13·25	48·00	55·85
February . . .	10·00	12·00	11·50	48·50	48·30
March	11·42	12·62	10·69	51·00	49·87
April	11·15	13·00	10·20	53·50	52·90
May	11·00	13·00	9·05	51·50	51·42
June	11·71	..	9·46	55·00	52·52
July	12·87	..	9·87	61·00	56·94
					(Refined & Filtered)

APPENDIX No. 2

MONTH-END WHOLESALE PRICES OF COTTONSEED OIL CAKE

(Rs. per md.)

Month-end		Cottonseed cake Bombay	(Undecorticated) Khanna
1956	January	7·50	7·50
	February	7·31	7·50
	March	7·50	8·75
	April	7·00	8·31
	May	7·50	8·50
	June	6·87	8·94
	July	7·12	8·75
	August	8·44	8·00
	September	8·25	8·62
	October	8·25	8·25
	November	8·25	7·00
	December	7·87	7·00
1957	January	7·12	N.R.
	February	6·87	6·75
	March	6·62	7·00
	April	7·12	8·00
	May	7·37	8·00
	June	N.R.	8·00
	July	7·75	8·31
	August	8·50	8·25
	September	7·31	8·87
	October	7·94	10·50
	November	8·44	8·75
	December	7·37	7·75
1958	January	6·74	7·25
	February	5·07	7·31
	March	6·25	8·12
	April	6·97	8·12
	May	7·55	8·25
	June	9·00	9·44
	July	9·36	10·00

APPENDIX No. 3

MONTH-END WHOLESALE PRICES OF GROUDNUT OIL

(Rs.per md.)

Month-end	Bombay	Madras	Kanpur	Hyderabad
		(Expellers)	(F.A.Q.)	
1956 January	44·75	43·12	47·00	43·31
February	46·25	42·94	49·00	43·25
March	55·06	51·50	50·00	55·00
April	54·00	51·00	70·00	56·00
May	54·62	52·81	64·00	56·50
June	53.62	50·69	51·00	52·00
July	52·50	50·56	59·00	51·50
August	53·62	54·31	63·50	56·00
September	54·00	48·69	53·87	50·81
October	54·25	49·56	63·50	50·75
November	55·75	53·00	62·00	55·00
December	53·81	51·19	57·00	53·31
1957 January	55·87	53·81	58·00	55·44
February	52·12	49·87	55·00	54·19
March	55·50	51·81	57·50	54·19
April	56·50	52·69	58·00	53·75
May	60·37	54·69	64·00	59·19
June	59·87	54·12	65·75	59·50
July	60·25	54·31	65·00	62·94
August	53·62	48·06	68·75	55·00
September	54·37	52·83	61·50	50·75
October	55·44	54·12	63·75	50·00
November	55·44	49·56	63·75	51·69
December	52·87	48·87	56·00	49·00
1958 January	50·33	46·58	55·00	48·75
February	49·03	46·25	52·00	47·94
March	52·16	48·05	57·00	48·75
April	52·73	50·69	60·00	50·81
May	54·52	49·21	59·00	51·69
June	55·10	52·34	61·50	53·31
July	60·97	57·76	66·00	58·75

APPENDIX No. 4

A NOTE ON ECONOMICS OF CONTINUOUS CENTRIFUGAL REFINING Vs. OPEN KETTLE REFINING OF COTTONSEED OIL

DISCUSSION:

Refining of crude cottonseed oil consists in treating the crude oil with alkali to remove free fatty acids, phosphatides, colouring matter such as gossypol and other non-oily impurities. The resultant product is pure neutral oil. It is very much lighter in colour and is practically free from fatty acids and other non-oily impurities.

The neutral oil content of the crude-oil is theoretically given by the simple formula

N—100—(F plus I)

Where N—Neutral Oil

F—per cent free fatty acid

I—Per cent of alkali reactive impurities other than free fattyacids comprising phosphatides and other non-glyceridic matter

The factor (F plus I) is technically known as "Wesson Loss" F, largely depends on the quality of seed from which the oil is expelled. If the seed has deteriorated owing to wetting or improper storage, the free fatty acid content of oil is high. In cottonseed oil this figure varies from 0·5% to as high as 25 to 30% in extremely bad cases. However, in actual practice the figure rarely exceeds 5 to 6 per cent and the oil from well stored seed usually average from is 1·5 to 3% under Indian conditions. The value of "I" for crude cottonseed oil in America varies from 0·6 to 2·4% with an average of 1·7 but for Indian oil a fair average of 2% may be assumed considering harvesting and storage conditions normally encountered in this country.

Although "Wesson Loss" gives the theoretical yield of neutral oil, in actual industrial practice the net yield of oil is always lower. This extra loss over the theoretical arises in several ways. But following are the main reasons.

1. Saponification of neutral oil by
   - (*a*) Direct action of excess caustic soda on the neutral oil.
   - (*b*) Hydrolysis of neutral oil by catalytic action of soapstock. As soon as neutral oil is split as a result of hydrolysis, the fatty acid combines with the excess alkali present in the miscella and is removed as soap. The reaction thus continues unabated unless the catalysing agent *e.g.*, soapstock and the alkali are separated from the neutral oil instantaneously.
2. Entrainment of neutral oil in the soapstock. This is mainly governed by :
   - (*a*) Grain structure of the soapstock which in turn depends on the strength of the caustic alkali used and time of contact.
   - (*b*) Force with which the soapstock is separated or is allowed to settle down.
   - (*c*) Surface active properties of non-glyceridic constituents of the soapstock which can be conditioned by reagents prior to refining.
3. Loss of neutral oil in wash waters as a result of emulsification. This loss can be minimised by employing very high separating force to separate oil particles from wash water.

While the theoretical loss depends on the value of (F plus I) the additional loss is entirely dependent on the process and type of equipment employed for refining purposes.

The crude oils produced from Groundnut, Kardi, Mustard and other oil bearing seeds are relatively light in colour and have normally a low F.F.A. But cottonseed oil owing to its dark colour, high F.F.A. and peculiar nature of its constituents, is difficult to refine by conventional open kettle methods. It requires special refining equipment such as Continuous Centrifugal Refinery for yielding oil of low colour which is impossible to achieve otherwise without incurring heavy refining loss.

Continuous V/S kettle Refining :

In kettle refining since the refining agent e.g. caustic soda is added to a large volume of oil, it is not possible to achieve quick and thorough mixing of the oil and alkali no matter how efficient the agitation and the alkali spraying are. Further as the soapstock and excess alkali are allowed to separate by gravitational force alone, the alkali remains in contact with the oil for a long time and as a result cosiderably more neutral oil is saponified. Higher alkali concentrations, which are helpful in removing the colouring matter, cannot be employed for fear of losing more oil by saponification. Since lighter concentrations of alkali have to be used, the soapstock formed is very soft and naturally entrains more neutral oil.

On the other hand, in centrifugal refining, the alkali and the oil are added in a thin stream. As a result mixing is perfect. Besides, time of contact is very short since the soapstock and excess alkali are instantaneously separated from the oil with the help of a vey high centrifugal force (it is often as high as 15000 times the gravitational pull) which prevents saponification and hydrolysis of neutral oil. Further the soapstock particles are squeezed out from neutral oil by centrifugal action and hence the soapstock is formed and relatively free from neutral oil

Another principal advantage in continuous centrifugal refining process is the low entrainment losses in the washing stage. Due to high centrifugal force practically no neutral oil is lost in wash water; at the same time last traces of soapstock and other gummy matter are removed along with the wash, which produces oil of extremely light colour and low F.F.A.

The yields of refined oil obtained by continuous centrifugal refining process as compared with the open kettle process are invariably higher by 1·5 to 2·5% for cottonseed oil of average F.F.A. content. The extra yield over kettle process increases with the increase in F.F.A. of the crude oil. While the principal advantage is the increase in yeield and decrease in colour of refined oil, the continuous process is not nearly so dependent on the skill of the individual refiner and is relatively free from vagaries of human judgment. As the alkali and oil are added in a thin stream quick changes in refining conditions are possible which cannot be had in kettle refining.

Refining Loss:

The two major suppliers of continuous centrifugal refining equipment in this country e.g., Sharples and De Lavals, guarantee following refining loss where W-% wesson loss.

(1) Sharples:

Percent refining loss is equal to 0·5 plus 0·25 plus $\frac{2}{80}$
(Low Loss Process)

(2) De Lavals

Percent Refining loss—0·8 plus 1·2W when W is less than 4%
—1·4W where W is more than 4%

The loss in open kettle refining is given by the Barrow Agee formula which has been found to be more or less accurate for average quality of cottonseed oil produced in South East & Mississippi Valley of America

Percent Refining loss—4·00 plus 2·1 (Per cent F.F.A.)

Under Indian conditions the above relationship is found to hold good for most practical purposes. Assuming the average F.F.A. content of the Indian cruide cottonseed oil is 2·2% and value of I approximately 2% the refining losses for the kettle, Sharples and De Laval processes are as follows:

1. Kettle 4·00 plus 2·1 (2·2)—8·62%
2. Sharples 0·50 plus 1·25 (2·2 plus 2.) $\dfrac{2\cdot)^{2}}{80}$ — 6·06%
3. De Laval 0·80 plus 1·2 (2·2 plus 2) — 5·60%

For the purpose of this note it would suffice to assume that the loss in contrifugal refining is of the order of 6% as against about 8·60% for kettle refining.

Economic Analysis:

The smallest continuous centrifugal refinery is of 10·15 tons per day capacity and figures worked out below are based on the Sharples 'Low Loss 'process. The cost of kettle refining is based on a 10-ton/day unit. Auxiliary equipment such as Boilers, Vacuum equipment, Compressor etc. are assumed to be already available at the factory and hence their cost is not included in the estimate.

A. *Cost Data*

	Rs.
Cost of Steam	10·00 per ton
Cost of electricity	0·06 per KWH
Cost of Water	0·75 per 1000 gals.
Price of Caustic Soda	40·00 per Cwt.
Price of refined cottonseed oil	1300·00 per ton
Price of soapstock (33% total fatty matter)	75·00 per ton

B. *Technical Data*

Average FFA of Crude Cottonseed Oil	2·2 %
Average Phosphatides and other non-oily impurities	2 %

C. *Working Data*

Quantity of to be refined per day	10 tons
Number of working days per annum Basis 8 months in a year	240 days
Total quantity of oil refined per annum	2400 Tons.

D. *Capital Investment*	*Kettle*	*Centrifugal*
Floor area required	3000 sq. ft	1000 sq. ft.
Cost of Building (estimated on basis of Rs.10/-per sq. ft.)	Rs. 30,000	Rs. 10,000
Cost of Machinery (installed)]	Rs. 50,000	Rs. 250,0000

E. *Requirement of Chemicals — Utilities per ton of Refined Oil*

Steam	900 lbs.	475 lbs.
Electricity	15 KWH	35 KWH
Water for Process and Reagents	140 Gallons	190 Gallon.
Caustic Soda	11 lbs.	9 lbs.
	(basis 55% excess)	(basis 30% excess

F. *Cost of Production per ton of refined oil*	*Kettle*	*Centrifugal*
Interest on fixed capital Investment @ 6%	Rs. 2·00	Rs. 6·50
Labour & Supervision:		
One Chemist, 3 Operators & 3 Refinery Assistants Total salary per month Rs.925	Rs. 4·60	Rs. 4·60
Steam	,, 4·00	,, 2·12
Electricity	,, 0·90	,, 2·10
Water	,, 0·11	,, 0·14
Caustic Soda	,, 3·90	,, 3·20
Depreciation & Maintenance (@ 10%)	,, 3·35	,, 10·80
TOTAL	,, 15·86	,, 29·466

G. *Additional Revenue with Continuous Centrifugal Refining.*

On basis of 2·2·% FFA in oil and 2% phosphatides and other nonoily impurities the loss in centrifugal refining has been shown to be approx. 6% and in Kettle 8·6%

a. Saving in refining loss per annum using centrifugal refining	$\frac{(2400\times 2\cdot 6\times 1300)}{100}$	Rs. 81,000
b. Excess expenditure on centrifugal refining	2400×(29·46-15·86)	Rs. 32,600
c. Return from sale of Soapstock	(2400×2·60)/ 033·×75	Rs. 15,600
Net saving by using continuous centrifugal refining	(81,000-32,600-15,600) .	Rs. 32,800

H. Time required for additional capital investment on continuous centrifugal refining to be repaid from additional profits (Rs.180,000/32,800) . . . . 5·5 Years.

Besides, the colour and F.F.A. of the refined oil will be extremely low and these would be considerable saving in subsequent bleaching, hydrogenation and post refining stages.

Cost of Bleaching and Deodourising per ton of oil

Following figures have been worked out on basis of bleaching and deodourising 9 tons of washed cottonseed oil obtained from 10 tons of crude oil.

A. *Cost Data*

Cost of bleaching earth . . .	Rs. 2000·00 per ton
Cost of activated carbon . . .	2500·00 per ton

B. *Technical Data*

FFA of washed oil	0·10 %
Moisture	0·05 %
Colour (Y plus 10 R ¼" Lovibond) .	16—18

NOTE : The colour of 16 to 18 of washed oil obtained after giving caustic wash to crude oil twice, initially with strong and subsequently with light alkali.

C. *Working Data*

Quantity of oil to be treated per day	9 tons
Number of working days per annum basis 8 months in a year	240 days
Total quantity of oil treated per annum	2160 tons

D. *Capital investment*

Floor area required	1300 Sq. ft.
Cost of building	Rs. 15,000
Cost of machinery (installed)	Rs. 50,000

E. *Chemials and Utilities per ton of bleached and deodourised oil*

Steam	2200 lbs.
Electricity	20 KWH
Water for process and reagents	40 gls.
Bleaching earth	33 lbs.
Activated carbon	11 lbs.

F. *Cost of production per ton of bleached and deodourised oil*

	Rs.
Interest on investmet @6%	1·80
Labour and Supervision:	
3 Operators & 3 Assistants	2·90
Steam	9·85
Electricty	1·20
Water	0·03
Bleaching earth	29·50
Carbon	11·30
Depreciation and Maintenance @10%	3·00
TOTAL	59·48

G. *Results*

The specification of the fully bleached and deodourised oil would be approximately as follows:

FFA	0·05 to 0·10%
Colour (4" Lovibond Y plus 10R)	2 to 6

APPENDIX No. 5

INVESTMENT AND YIELD IN RELATION TO A COTTONSEED CRUSHING PROJECT—60 TONS PER DAY AVERAGE WORKING CAPACITY

A modern plant of the above capacity would require following equipment for most economical and efficient operation.

A. *Preparatory or Linter Section*

1. One 199A Bauer Pnematic Cleaner with cyclone. 10 H.P.

2. 12 Carver 176—Saw individual drive linter Machines, 4 of which are arranged for 1st cut with condensers and dust control system and remaining 8 for 2nd cut with pnematic control system. 15 H.P. per Linter Machine, 30 H.P. for Pneumatic Lint flue system.

3. One Lint Cleaner of 15000 lbs/day capacity which a low density press for pressing linters into bales. Total 40 H.P.

4. One Tru-Line gummer suitable for 176 saw 3 h.p.
5. One 36" Safety Shaker with direct drive arrangement 2 h.p.
6. One 48" Carver Huller with Shaker and purifying nozzles 15 h.p.
7. One carver Hull and Seed Separator with 35" fan 10 h.p.
8. One Carver Hull beater with 30" fan 7 h.p.
9. One Hull Packer 20 h.p.

10. Following storage bins :—

(*a*) White seed bin . . .	5 ton capacity
(*b*) Black seed bin . . .	10 ton capacity
(*c*) Meat bin	5 ton capacity.

11. Set of screw conveyors 9" size, bucket elevators 8" size. Motors and other accessories for the entire section.

Sundry Power Requirment	33 H.P.
Total installed H. P. for Linter Section	350 H.P.

B. *Expeller Section*

1. One 5 high 48"×16" diam. rolls complete with electrical drive.

2. One 5 high 85 stack cooker-dryer with side and bottom heating, first two stacks arranged for cooking and bottom three stacks for drying complete with exhaust fan arrangement, electrical drive, etc.

3. 12 standard size Expellers such as Max oil or desi type.

4. Set of screw Conveyors 9" size, bucket elevator 8" size. Motors and other accessories for the entire section.

Total installed H.P. for Expellers Section—250 H.P.

C. *Refinery Section.*

A continuous centrifugal Refinery of 10/15 tons capacity either of Sharples or De Laval make.

A 3½ tons bleacher and deodorizer for processing 10 tons oil/day Total H.P. for Refinery Section—30 H.P.

D. *Boiler House.*

Two boilers with a capacity to generate 4000 to 5000 lbs. per hour each. One will be a standby.

Laboratory.

Equipped with apparatus for oil and Nitrogen determination and further routine tests required to be carried out in an oil Mill. Lovibend tintometer for colour determination and standard equipment for testing refining loss of crude oil also essential.

Electrical Switch Gear, transformers etc. 500 KVA Transformer & Switch gear including Power Factor improvement equipment.

Land.

An area of at least 10 Acres is absolutely essential, preferably with railway siding. Importance of the latter cannot be minimised since cottonseed is a very bulky agricultural produce and will involve enormous handling problems in the long run. Area, more than 10 acres would be more beneficial from the long range point of view.

Buildings.

Following estimate of Building area is based on actual first hand experience gained in putting up similar cotton plant in India, and represents barest minimum space requirement for efficient and uninterrupted operation.

	Sq. ft.
A. *Linter Section*	
(*a*) Seed Cleaning Room	1000
(*b*) Linters room	3000
(*c*) Lint Cleaning & baling room	1500
(*d*) Hulling room	2000
Total area	7500
B. *Expeller Section*	
(*a*) Rolling, cooking and drying room	900
(*b*) Expeller room	1700
Total area	2600
C. *Refinery Section*	
(*a*) Continuous Centrifugal Refinery room	1000
(*b*) Bleaching and Deodorizing room	1300
Total area	2300
D. *Boiler House*	1700
E. *Laboratory*	500
F. *Office Building*	1500

GODOWNS & OIL STORAGE SPACE

A. *Seed Storage*

A space for storage of at least 3000 tons of cottonseeds is essential for a crushnig mill of 60/75 tons capacity. This represents a space for storage of 1½ to 2 months requirements of cottonseeds. A muskage type hanger of 90′ span by 75′ long would suffice this purpose and would be ideal but it would cost around Rs. Four lacs with duct work and cooling arrangement. Under Indian conditions in upcountry centres, where humidity is lower,stacking seed in bags would not present serious problems of seed deterioration especially when crushing operation is restricted to 8 months. An ordinary type of Godown would serve this purpose adequately. On basis of 20′ high stacking the floor space required would be 15,000 sq. ft. (Density of American type seed is 25 lbs. sq. ft. per cu. ft.)15,000

B. *Cake Storage* :

On an average one months production of cake is required to be stored *i.e.* 1000 tons. On basis of 15′ high stacking, space required would be—3,000.

(Density of decorticated cake is 45 lbs. per cu. ft.).

C. *Storage for Hulls.*

Production Hulls would be approximaterly 500 tons per month. Storage for one months production i.e. 1000 tons hulls would be—3,000.

(Density of hulls : 18 lbs./cu.ft. packed in gunnies).

D. *Oil Storage.*

(*a*) Crude Oil	50 tons capacity tank.
(*b*) Washed Oil	150 tons capacity tank.
(*c*) Refined oil	30 tons capacity tank.

Cylindrical tanks vertically placed would be desirable for economy of space and ease of calibration etc.

Capital requirements for the project.

A really modern and up-to-date project of this type would require a capital of at least 25 lacs, 18 lacs in fixed capital investment and 7 lacs as working capital including investment in stores, spares, etc. The detailed estimate is given below. If an oil mill is already existing the extra fixed capital investment would be of the order of 6¼ lacs only in the preparatory of linter section. Other machinery and facilities are assumed to be available. Appendix A gives the estimate of various Linter section machinery delivered ex Bombay based on latest quotations.

FIXED CAPITAL INVESTMENT :

A. *Machinery* (Installed)	Rs.
(1) Linter Section	6,50,000
(2) Expeller Section	3,50,000
(3) Refinery Section	3,00,000
(Basis Sharples Plant 10/15 tons capacity.)	
(4) Boilers etc. (secondhand in good condition)	80,000
(5) Laboratory equipment	10,000
(6) Electrical Switch Gear & Transformers	60,000
	14,50,000
B. *Land*	10,000
	14,60,000

C. *Buildings* :

	Sq. ft.	Rs.	
(1) Linter Section	7,500	60,000	
(2) Expeller Section	2,600	21,000	
(3) Refiner Section	2,300	18,000	
(4) Boiler House	1,700	14,000	
(5) Laboratory	500	5,000	
(6) Office Building	1,500	15,000	1,33,000
			15,93,000

D. *Godowns & Oil Storage Tanks*

	Sq. ft.	Rs.	
(1) Seed Storage	15,000	1,00,000	
(2) Cake Storage	36,000	20,000	
(3) Hull Storage	36,000	20,000	
(4) Oil Storage	230 tons	42,000	1,82,000
Total Capital Investment			17,75,000
Say Net Fixed capital Investment }			18,00,000

Working Capital.

(*a*) Stores, spares, maintenance tools etc.	2,00,000
(*b*) Working capital for raw materials & finished products	5,00,000
Total	7,00,000

Besides Cash Credit facilities from Banks upto Rs. 12 lacs are desirable and necssary

Utilities Requirements

The figures per ton of seed crushed are based on experience gained in operating a plant of similar capacity in India.

	Per ton of seed crushed
(1) Electric Power	125 k.w.h.
(2) Water	130 to 140 gallons
(3) Fuel (Coal)	150 lbs.

Yield of finished products.

The yield of different products would be as follows :—

	Per cent
Linters 1st cut	2
Linters 2nd cut	6 to 6½
Decorticated Cake	45
Oil (Wahsed)	12½
Cleaning and processing loss	6½
Hulls	25½
Soap-Stock	2·7

The above yields are based on the crushing of the prime quality of fuzzy variety of cottonseeds of the following composition :—

Oil Content	17½ %	Clean seed, as is basis.
Linters content	11—12%	,,
Moisture content	6—7%	
Residual Oil-Cake	43—45%	

The yield of oil given above is based on leaving not more than 6% oil in the decorticated cake.

Price of Cottonseed Preparatory machinery :—

Particulars*	F.O.F. Cars N.Y.	C.I.F. Bombay (CIF cost 18%)	C.I.F. price in Rs.	Price including duty & clearance @(10% 2%)
1	2	3	4	5
			Rs.	Rs.
1. 199ABauer Pneumatic Cleaner		8600·00	41500·00	46,500·00
2. P4S 176 Saw Carver Linter Machine with Condenser.	3617·00	4300·00	20,600·00	24,300·00
3. Tru-Line Gummer with Motor Drive & Motor	5245·00	6200·00	29,800·00	33,500·00
4. 48″ Carver Concave Huller Complete with Shaker and Purifying Nozzle	6659·00	7850·00	37,800.00	42,000
5. H. & S. Machine with 35″ Fan	2039·00	2400·00	11,500·00	12,900·00
6. Hull Beater with 30″ Fan	2082·00	244·00	11,800·00	13,200·00
7. P4S Saw Carver Linter Machine without Condensor for lint flue system	3135·0	3700·00	17,800·00	20,000.00
8. Carver Lint flue system for 10—12 Linter machines	6256·00	7400·00	35,500·00	40,000·00
9. Carver Dust Control system suitable for 5/6 Linter machines	3245·00	3850·00	18,400·00	20,500·00
10. Carver lint Cleaner 15000 lbs. Capacity/24 hours.				
Cellulose Control Basket	3216·00			
Lint tailings Beater	558·00			
Shale Shaker	411·00	4950·00	23,800·00	26,300·00
11. Bailing Press	12000·00	14200·00	68,000·00	76,000·00
12. Hull Packer	2200·00	2600·00	12,500·00	14,000·00

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*The above estimate does not include cost of Electric Motors and accessories.

APPENIDX No. 6

SURVEY (1957) OF THE COTTON SEED OIL INDUSTRY IN INDIA

1. (*a*) Name and full address of the factory.
   (*b*) Name of the State in which your unit is situated according to the recent re-organised set up.
   (*c*) Names of Proprietors/Managing Agents.
2. When was your factory started.
3. Is your factory registered under the Indian Factories Act.
4. Is your factory registered under the Industries (Dev. & Reg.) Act.
   If so please give the registration No. and date of registration.
5. Capital investment :
   (*a*) Building & Site.
   (*b*) Machinery & equipment.
   (*c*) Other items.
   Total: ....
6. From where do you obtain your requirements of Cotton-seeds.
7. Quantity of cottonseed oil and other by products produced during the last 3 years :—

Type of cotton seed	Quantity of cottonseed crushed in (tons)	Production in tons			
		Cotton-seed Oil 55 56 57	Cotton linters 55 56 57	Decorticated cake 55 56 57	Un-decorticated 55 56 57
1. Desi variety					
2. American Fuzzy type					

   (*b*) Do you crush any oilseeds other than cottonseed. If so, please give the names of the oils seeds and also production of these oils during the last 3 years as above.
8. (*a*) Annual crushing capacity in tons on the basis of 24 hrs. working 300 days a year. ....tons of in terms of cottonseed
   (*b*) No. of shifts worked per day & the No. of working days in a year.
9. (*a*) Do you possess delinting and hulling machinery ?
   (*b*) Please give a list of machinery as below :

Sl. No.	Name of the machinery	When installed	Make	Annual capacity of each (in terms of seeds)	(Annual) Total capacity in terms of cottonseed
1	Expellers . . .				
2	Delinting machinery .				
3	Hulling machinery .				
4	Defibrators if any .				
5	Seed cleaners (if any) .				
6	Separators . . .				
7	Roller mill for flaking .				
8	Cookers . . .				
9	Peolleting machinery .				

(*c*) Is your existing delinting and hulling capacity balanced with that of the expellers. If not, please indicate briefly the steps which you propose to take.

(*d*) If you do not possess delinting and hulling equipment, do you propose to modernise the unit in order to increase the yield and also the the oil quality of Please indicate the steps proposed to be taken by you briefly.

10. Give details of the technical personnel employed in your factory.

Holders of	Diploma	Degree Graduate or equivalent	Masters' degree	Doctorate	Total
Chemists					
Chemical Engineers					
Total :					

11. (*a*) Do you possess a vegetable oil refinery ?

(*b*) If so when was it installed.

(*c*) Please give a list of equipment in your refinery and the make.

(*d*) What is the installed capcity per annum of your refinery in terms of refined oils. Capacity..........................tons of refined oils per annum.

(*e*) Do you refine cotton seed oil & Sell it as edible oil. Please give briefly the refining & bleaching process adopted by you.

12. Number of workers employed by you per shift.

13. Do you market the products in the country or are these products being exported by you.

(*b*) If the reply to the latter part above is in the affirmative please give the particulars below.

Name of the item	Quantity exported during 1955	1956	1957
1. Cottonseed oil.			
2. Decorticated Cottonseed cake.			
3. Undecorticated Cottonseed cake.			
4. Linters.			
5. Hulls.			

(*c*) Countries to which exported may also please be given.

14. Please give the prices of these products in the country & abroad.

	Selling price per ton in the country	C. I. F. price per ton
Cottonseed oil.		
Docor. Cottonseed cake.		
Undec. ,,		
Cotton linters		
Hulls.		

15. What is the Oil content of the oilcake obtained from the expeller.

16. Percentage recovery of the products obtained.

(*i*) Cottonseed oil.

(*ii*) Oilcake—
specify decorticated or undecorticated.

(*iii*) Linters

(*iv*) Hulls.

17. What is your overall daily capacity in terms of cottonseed oil for all the working shifts.

18. Do you propose to effect any expansion to your existing factory or have you any plans to set up a modern cottonseed processing factory in any part of the country. Give full details of your production programme as below :—

   (*i*) Annual capacity proposed (in terms of seeds).

   (*ii*) Location of the plant

   (*iii*) Requirements of capital equipment—

      (*i*) Indigenous

      (*ii*) Imported Hard Currency area

      S.C.A.

   (*iv*) When production is expected to be established

19. Does your oil mill work to full capacity. If not please indicate the specific difficulties experienced by you

   Financial difficulties

   Transport difficulties.

   Storeage difficulties.

   Difficulties in marketing the products.

   Any technical difficulty regarding machinery, inefficient processing technique etc.

20. What are your suggestions for developing the cottonseed crushing industry on a sound basis.

मेव जयते

Name of the applicant.

Signature of the Proprietor.

Date

Station :

APPENDIX No. 7

No. ——
MINISTRY OF COMMERCE AND
INDUSTRY DEVELOPMENT WING
OILS, PAINTS AND PLASTICS ETC.
SHAHJAHAN ROAD,

New Delhi—2, dated the 1958

To

Committee on Cottonseed oil industry

Dear Sir,

Ministry of Commerce and Industry have set up a Committee on Cottonseed oils industry to examine the immediate problems of the industry and to suggest ways and means for its speedy development. This Committee is also expected to make recommendations regarding immediate problems of the Industry, including improvements in processing technique and standardisation of the quality of cottonseed oil and by products, of the industry, as well as development of the use of decorticated cotton-seed cake.

Since your Institute/Department is known to be a centre for training and research in oil technology, you are requested to send us copies of papers and details of research work done in your Institute/Department on cottonseed, cottonseed oil, cottonseed oil-cakes, hulls and linters. This information will be of value in the work of the Committee, particularly in respect of the development aspects. Any other views which you may like to put forward for consideration by the Committee will also be welcomed.

An early reply will be appreciated.

Yours faithfully,
V. A. MEHTA,
Member, Secretary
Committee on Cottonseed Oil Industry.

APPENDIX 8

MINISTRY OF COMMERCE AND INDUSTRY DEVELOPMENT WING

COMMITTEE ON COTTONSEED ON INDUSTRY

Questionnaire for Dairy Farms/Agricultural Colleges/Pinjra poles.

1. Name and address.
2. Total number of livestock under the control of the farm.
3. Consumption of different types of animal feeds.

Sl. No.	Name of the feed	Consumption in		
		1955	1956	1957

N.B.—Information regarding.

- (i) Decorticated cottonseed oil cake.
- (ii) Undercorticated cottonseed oil cake
- (iii) Cottonseed hulls.
- (iv) Whole cottonseed.
- (v) Mixture of hulls and decorticated cake may be given separately in the above table along with information regarding the consumption of other animal feeds.

4. What is your opinion regarding the feed value of decorticated cottonseed cake in comparison with :—

- (a) Undercorticated cotton seed cake and
- (b) Other oil-cakes.

5. Please give the names and addresses of the source or sources from which you purchased :

- (a) whole cottonseed,
- (b) decorticated cottonseed cake,
- (c) undercorticated cottonseed cake,
- (d) hulls,
- (e) Mixture of hulls and decorticated cake,

during 1957 and the average price paid per maund. Please indicate whether this price is ex-mill or delivered to your Farm, and the component due to freight and handling.

6. To what extent can you step up the consumption of cottonseed oil cake in 1958.

Name ....

Address ....

APPENDIX 9

upplementary Questionnaire for Cottonseed Mills

1. *Quantity of cotton-seeds crushed (in tons)*

Sl. No.	Details	In 1956	In 1957
	(*a*) Desi variety		
	(*b*) Improved variety rich in linters		
	TOTAL		

2. *Production*

Name of the item	Production in tons	
	1956	1957
(*a*) Crude cottonseed oil		
(*b*) Washed oil produced out of (*a*)		
(*c*) Refined oil produced out of (*b*)		
(*d*) Decorticated oil-cake		
(*e*) Undercorticated oil-cake		
(*f*) Cotton linters		
(*g*) Hulls		

3. Please give details of the process following by you for (a) washing and (b) refining the crude cottonseed oil.

4. *Marketing of the products.*

Sl. No.	Item	Quantity exported in tons		Quantity sold in the internal market	
		1956	1957	1956	1957
	(*a*) Crude cotton seed oil .				
	(*b*) Washed cottonseed oil .				
	(*c*) Refined cottonseed oil .				
	(*d*) Decorticated oil-cake .				
	(*e*) Undercorticated oil-cake .				
	(*f*) Cotton linters . . .				
	(*g*) Hulls				

5. *Export market*

Please give the names of the countries where different cottonseed products were exported in 1957 (item-wise and country-wise). F. O. B. or C. I. F. prices of recent deliveries may be given together with relevant dates.

6. *Internal market.*

Please give the names and addresses of parties to whom different cottonseed product were sold during 1957 (itemwise). Average wholesale price during last 6 months (month-wise and item-wise) may please be given.

7. Please give your suggestions, if any, for consideration of the committee in regard to (*a*) specific difficulties faced by the industry and (*b*) how to develop the industry expeditiously on a sound basis.

Name ....

Address ....

....

....

APPENDIX 19

MINISTRY OF COMMERCE AND INDUSTRY, DEVELOPMENT WING

COMMITTEE ON COTTONSEED OIL INDUSTRY

Questionnaire for the Director of Industries

1. Name of the State.

2. Production of cotton and cottonseeds in your State.

Year	Production of cotton in bales	Production of cottonseed in tons		
		Desi variety	American variety	Total
1953-54				
1954-55				
1955-56				
1956-57				

3. Names and addresses of cottonseed crushing mills in the State under the following two categories :—

   (*a*) Modern units equipped with delinting and hulling machinery and their individual capacities in tons per day on three shift basis in terms of cottonseed.

   (*b*) Vegetable oil mills which crush cottonseed irregularly and not equipped with delinting and hulling equipments. Daily capacity of the individual units in tons on three shift basis in terms of cottonseed if information is readily available.

4. Names and addresses of cotton ginneries in the State.

5. Views and general comments on the terms of reference to the Committee.

6. Your considered opinion in regard to further development of cottonseed oil industry in the State modern lines keeping in view the availability of cottonseed and consumption of cottonseed oil.

Name ....
Address ....
....
....

APPENDIX II

MINISTRY OF COMMERCE AND INDUSTRY
DEVELOPMENT WING

COMMITTEE ON COTTONSEED OIL INDUSTRY

Questionnaire for vanaspati factories

Name and address of vanaspati factory.

2. Consumption of raw oils in the manufacture of vanaspati.

Year	Consumption of different raw oils in the manufacture of vanaspati						Total production of vanaspati in tons
	Groundnut oil	Sesamum oil	Cotton-seed oil	Other oils	Total	Percentage of (*d*) to	
(*a*)	(*b*)	(*c*)	(*d*)	(*e*)		(*f*)	
1954 .							
1955 .							
1956 .							
1957 .							

3. Consumption of cottonseed oil, if any, in the manufacture of other products.

Year	Quantity of cottonseed oil consumed in tons in the manufacture of			
	Refined cottonseed oil for use as cooking oil	Industrial hardened oils	Other products	Total
1954 .				
1955 .				
1956 .				
1957 .				

4. Procurment of cottonseed oil

Please give names and addresses of (*a*) Cottonseed oil mills and (*b*) normal trade channels from whom cottonseed oil was purchased in 1956 and 1957. This information may be given in a separate enclosure.

5. Do you purchase crude or washed cottonseed oil? What are your stipulations regarding the quality of cottonseed oil required for the manufacture of :

(*a*) Vanaspati.
(*b*) Refined cooking oil.
(*c*) Industrial hardened oil etc.

6. What technical difficulties, if any, are faced by you in the use of washed cottonseed oil procured from cottonseed oil mills ? Do you prefer to purchase crude cottonseed oil instead of washed oil ?

7. (a) Percentage of cottonseed oil used by you satisfactorily in the past in the manufacture of vanaspati.

(b) Percentage of cottonseed oil which could be used satisfactorily by you in the manufacture of vanaspati at present.

(c) Given sufficient supply of cottonseed oil of satisfactory quality, what *maximum* percentage could be used by you in the manufacture of vanaspati and under what circumstances ?

(d) What is your opinion regarding manufacture of vanaspati wholly from cottonseed oil. The circumstances under which this can be done may be specified.

8. What is your envisaged production of vanaspati in 1958 and how much cottonseed oil you propose to consume in its manufacture ?

9. If you have not used cottonseed oil in the manufacture of vanaspati in the past the reasons may be explained. If you are not in favour of such use, what is the basis of your objection ?

10. Have you got a scheme to crush cottonseed on your own, in the near future (with delinting and hulling). If so, please give brief particulars ?

Name ....
Address ....
....
....

APPENDIX 12

No............

GOVERNMENT OF INDIA,

MINISTRY OF COMMERCE
AND INDUSTRY,
DEVELOPMENT WING

Committee on Cottonseed Oil Industry,
Shahjahan Road, New Delhi,
Dated December, 1957.

Dear Sirs,

Government of India have recently appointed a Committee on Cottonseed Oil Industry as per details given in the enclosure. A questionnaire has also been issued to all Cottonseed Oil Mills, a copy of which is also enclosed. You are requested to furnish a general note regarding the present position of Cottonseed Oil industry in your State with particular reference to the working of your members. You are also requested to offer your comments and information on the terms of reference to the Committee and also your suggestions for speedy development of this industry. Any facts and figures submitted by you in this regard would be welcomed.

The Committee has issued comprehensive questionnaires to Vanaspati industry, Dairy farms and Cottonseed oil mills and Directors of Industries. You are requested to offer your comments on the problems indicated in all these questionnaires. (Copies enclosed).

As the Committee is expected to finalise its report within a short period, your early reply is requested.

Yours faithfully,
V. A. MEHTA,
Member-Secretary,
Committee on Cottonseed Oil Industry.

APPENDIX 13

No. ....

GOVERNMENT OF INDIA

MINISTRY OF COMMERCE AND INDUSTRY,
DEVELOPMENT WING

Committee on Cottonseed Oil Industry,
Shahjahan Road,
New Delhi, Dated December, 1957.

Dear Sirs,

Government of India have recently appointed Committee on Cottonseed Oil industry in order to make suggestions regarding the speedy development of this industry. Cotton seed oil is used by several soap manufacturers and the above Committee would like to know the total consumption of this oil for this purpose and the types of soaps in which Cottonseed oil is used. You are requested to furnish the following data also as soon as possible and in any case not later than 8th January, 1958 :—

1. Total production of soap during 1955, 1956 and 1957 under the following heads :
    (*a*) Toilet Soap.
    (*b*) Laundry Soap.
    (*c*) Others.

2. The total consumption of vegetable oils during 1955, 1956 and 1957 and names of different oils used.

3. Quantities of Cottonseed oil consumed during 1955, 1956 and 1957.

4. Names of the parties from whom Cottonseed oil was purchased during 1957 and the price paid.

5. What is your opinion regarding the use of Cottonseed oil in the manufacture of soap and are you satisfied with the quality obtained from indigenous sources. If not what are your specific complaints in this connection ?

Yours faithfully,

V. A. MEHTA,
Member-Secretary,
Committee on Cottonseed Oil Industry.

GMGIPND—L—145 C&I—5-11-1959—500